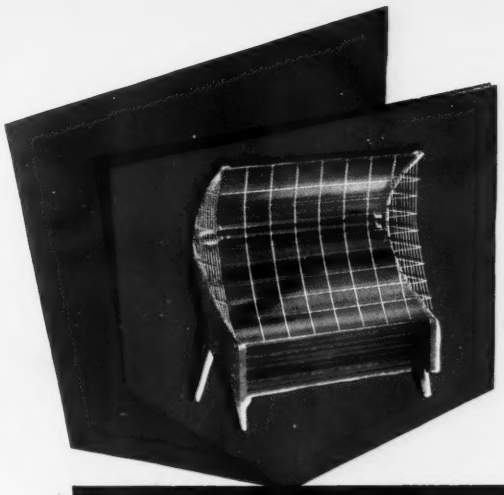
ELECTRICAL REVIEW

NOVEMBER 1954 ONE SHILLING



Model F.3117 is one of a wide range of Ferranti Radiant Electric Fires including floor, panel and wall types of contemporary design.

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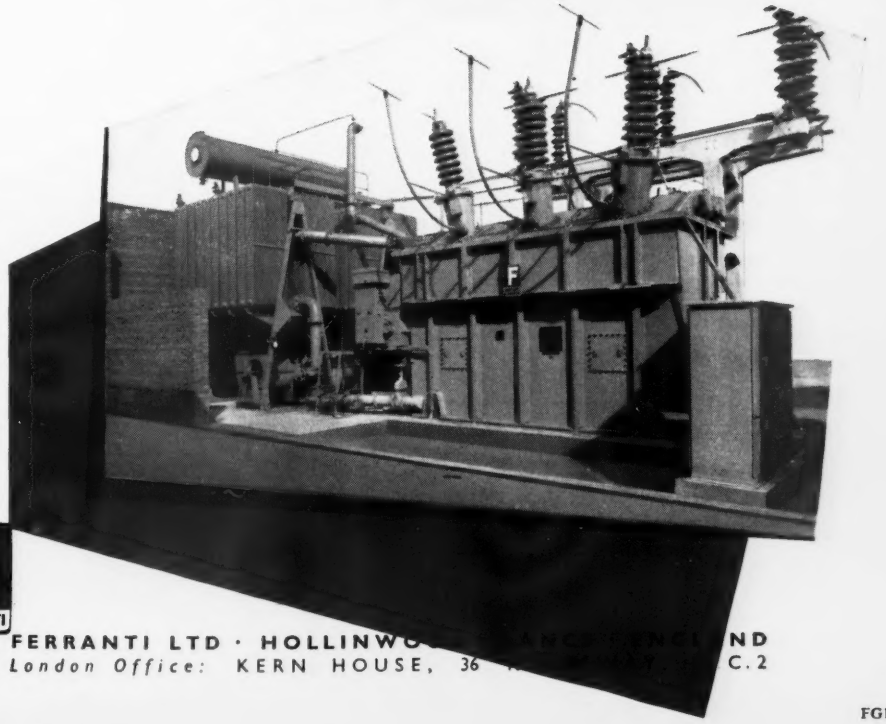

One of two 100 MVA 3-phase 132/33 kV Star/delta connected Ferranti Transformers installed at the Low Road Substation, Leeds, for the British Electricity Authority.

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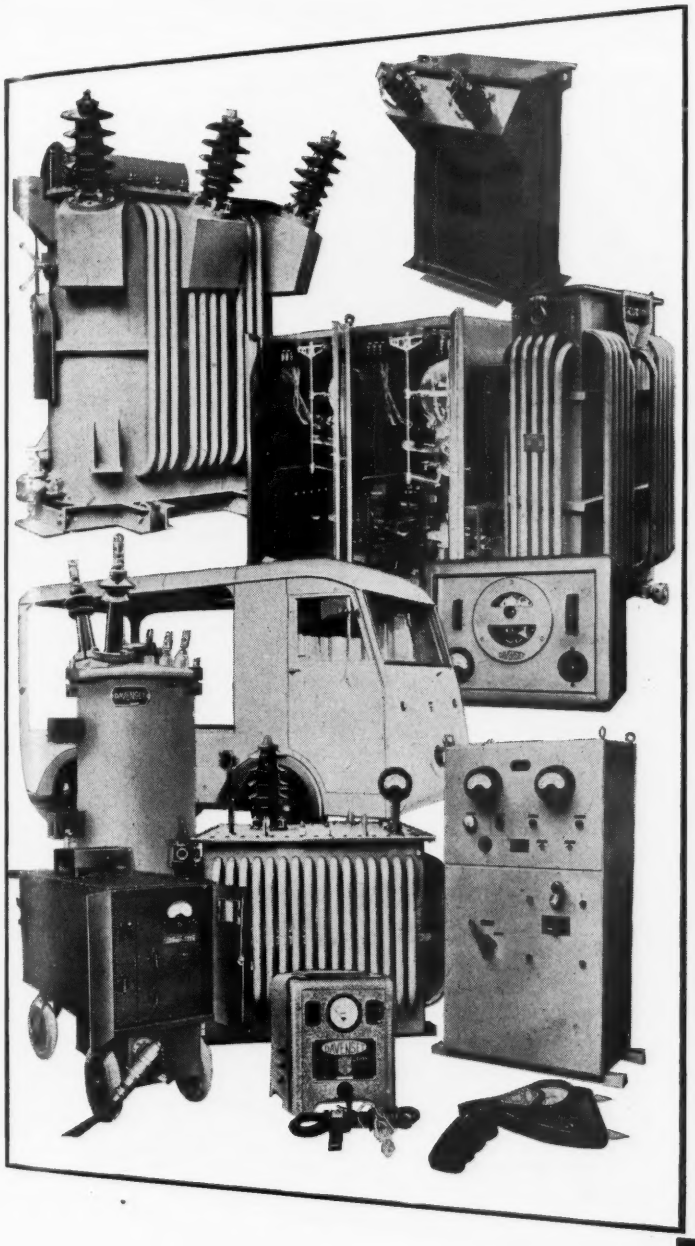

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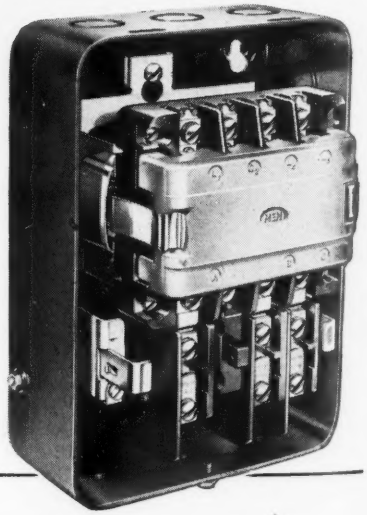

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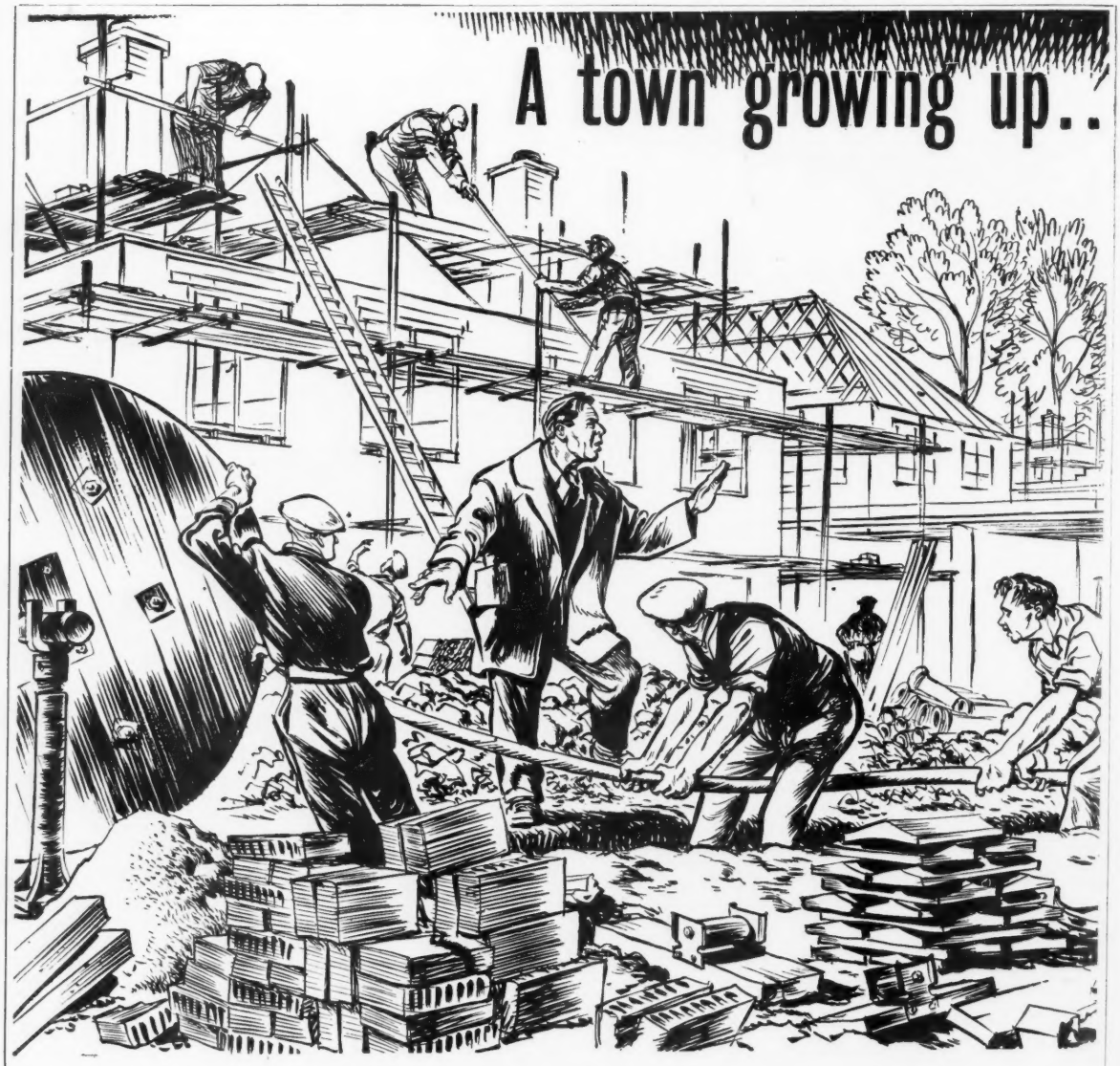

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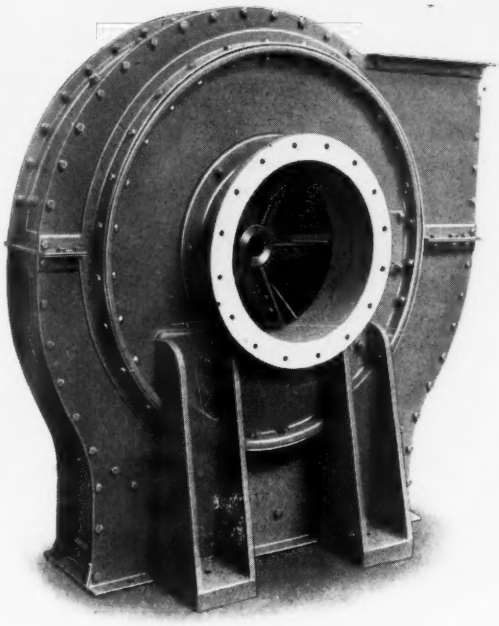

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for Boiler Houses

DETAILS FROM OUR REFERENCE U.101

The top illustration shows an impeller for Induced Draught Fan, and the lower illustration a Pulverised Coal Handling Fan

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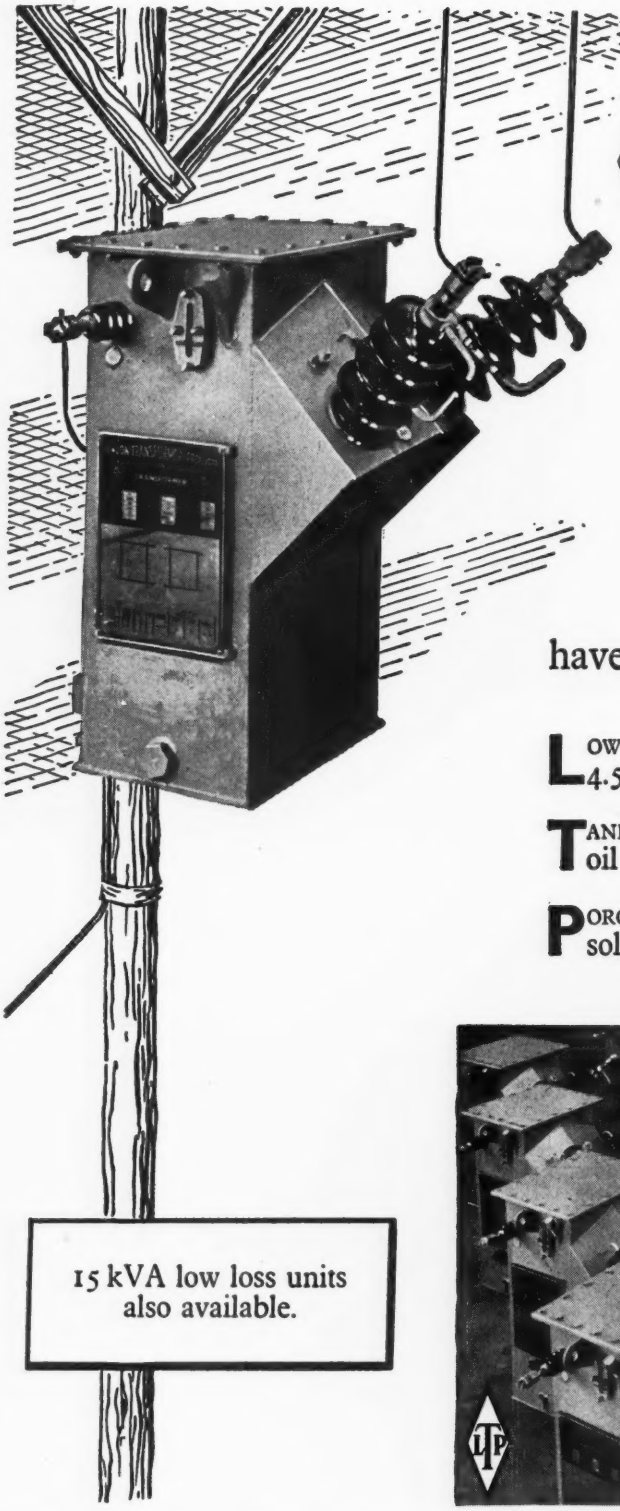

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Inoculating Molten Iron with Nickel Magnesium

PHYSICAL PROPERTIES OF S.G. IRON

PROPERTY	S.G. IRON		NOduMAG
	AS CAST	*ANNEALED (FERRITIC)*	*AS CAST*
ULTIMATE TENSILE TONS/SQ. INS.	40-45	28-35	25-30
YIELD POINT TONS/SQ. INS.	25-35	20-25	18-22
ELONGATION %	3-5	20-25	10-13
REDUCTION IN AREA %	4-5	21-25	14-16

The above table shows average figures arrived at after taking independently conducted tests over a long period.

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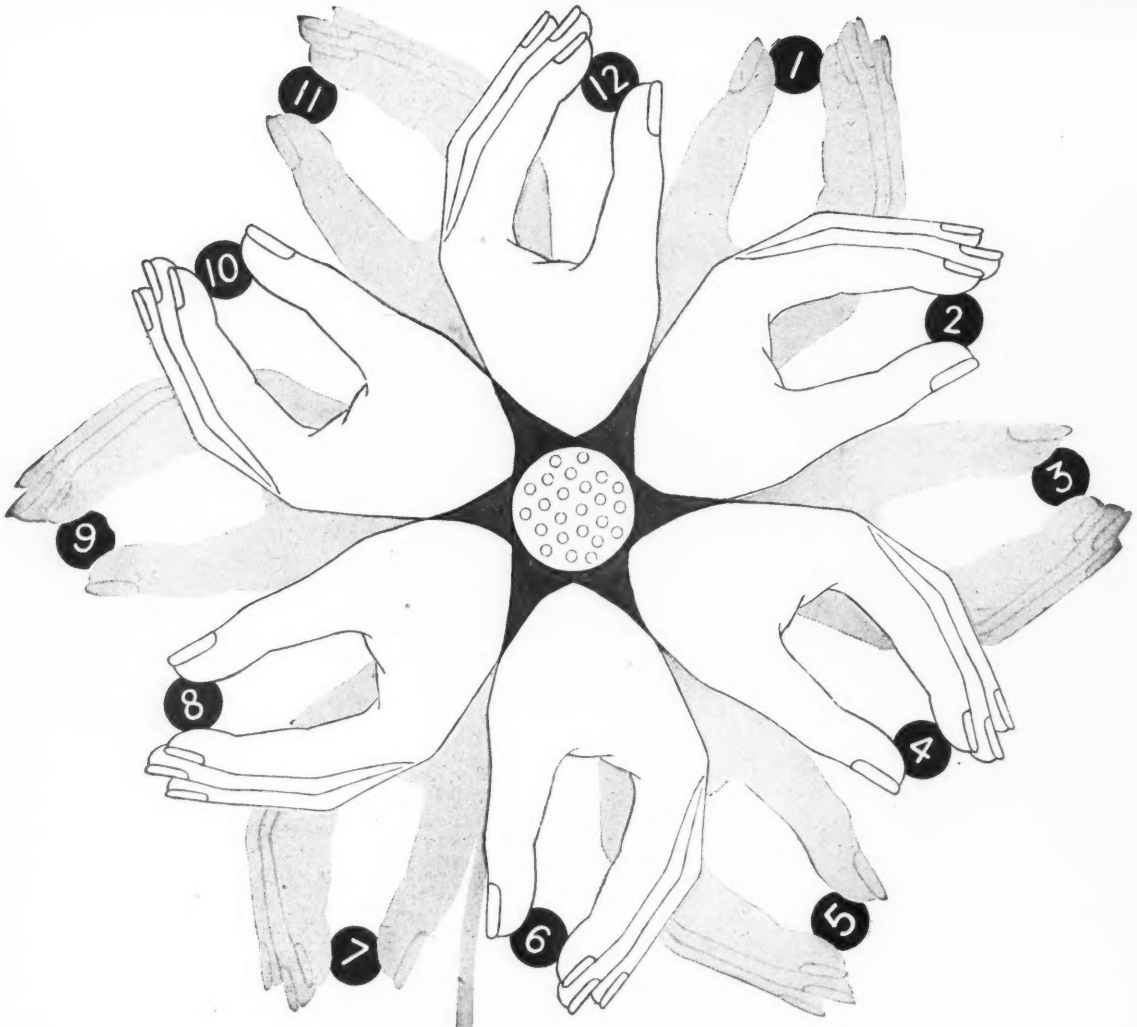

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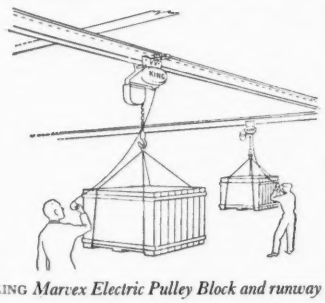
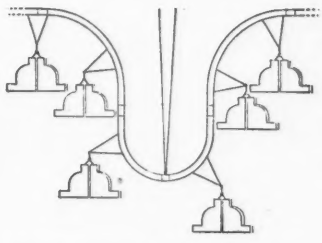


A KING *Marvex Electric Pulley Block and runway*



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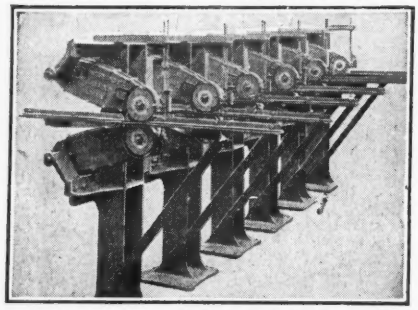

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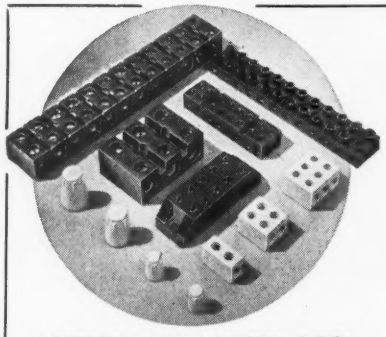

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These are fully described in our Catalogue No. NBL/2/ER

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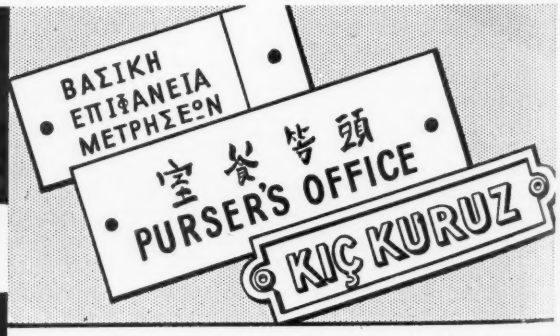

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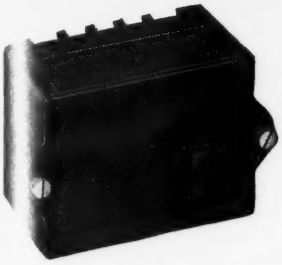

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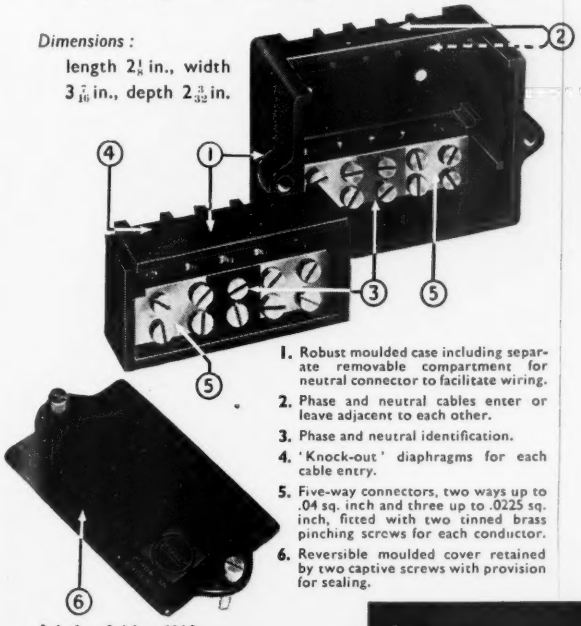

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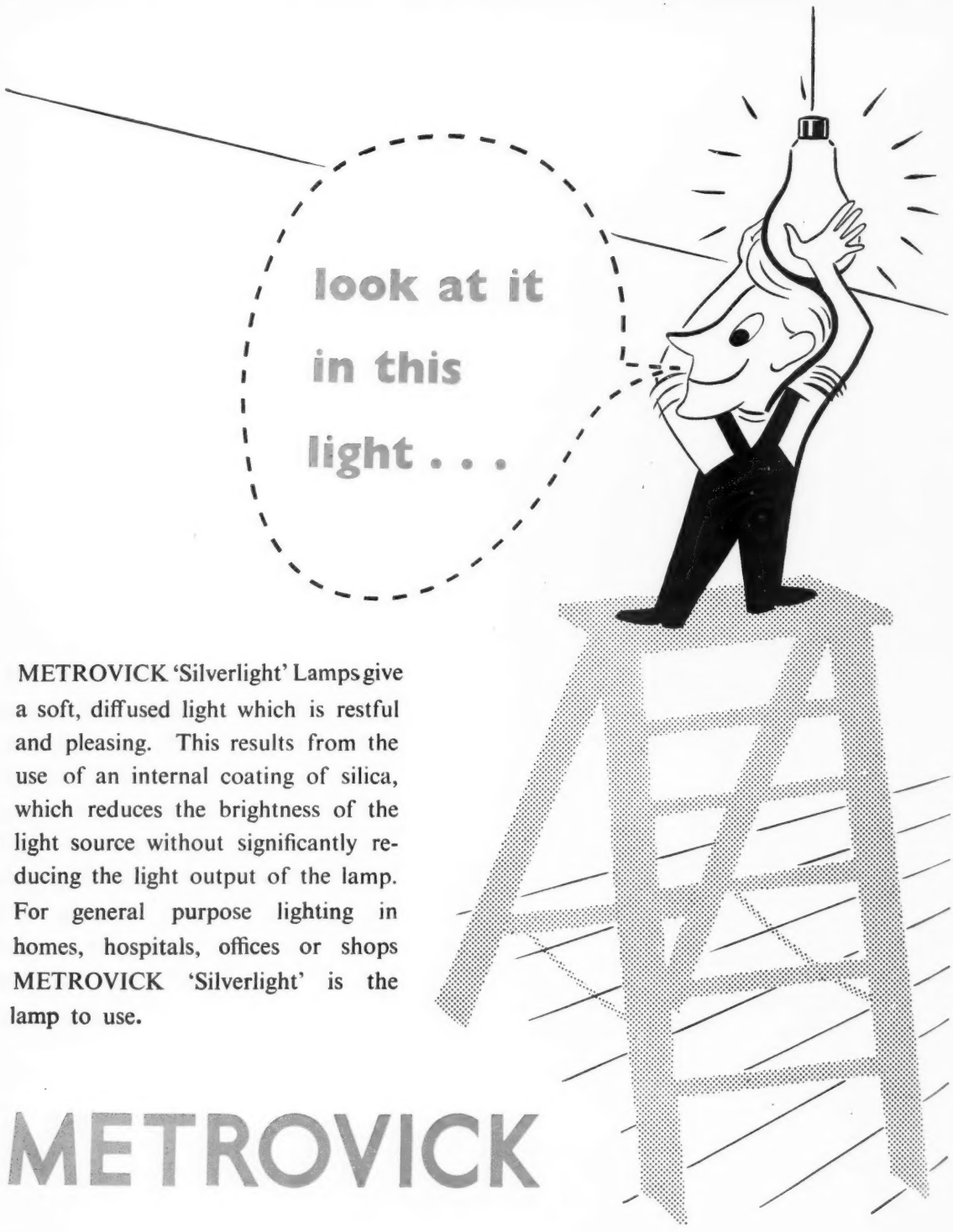

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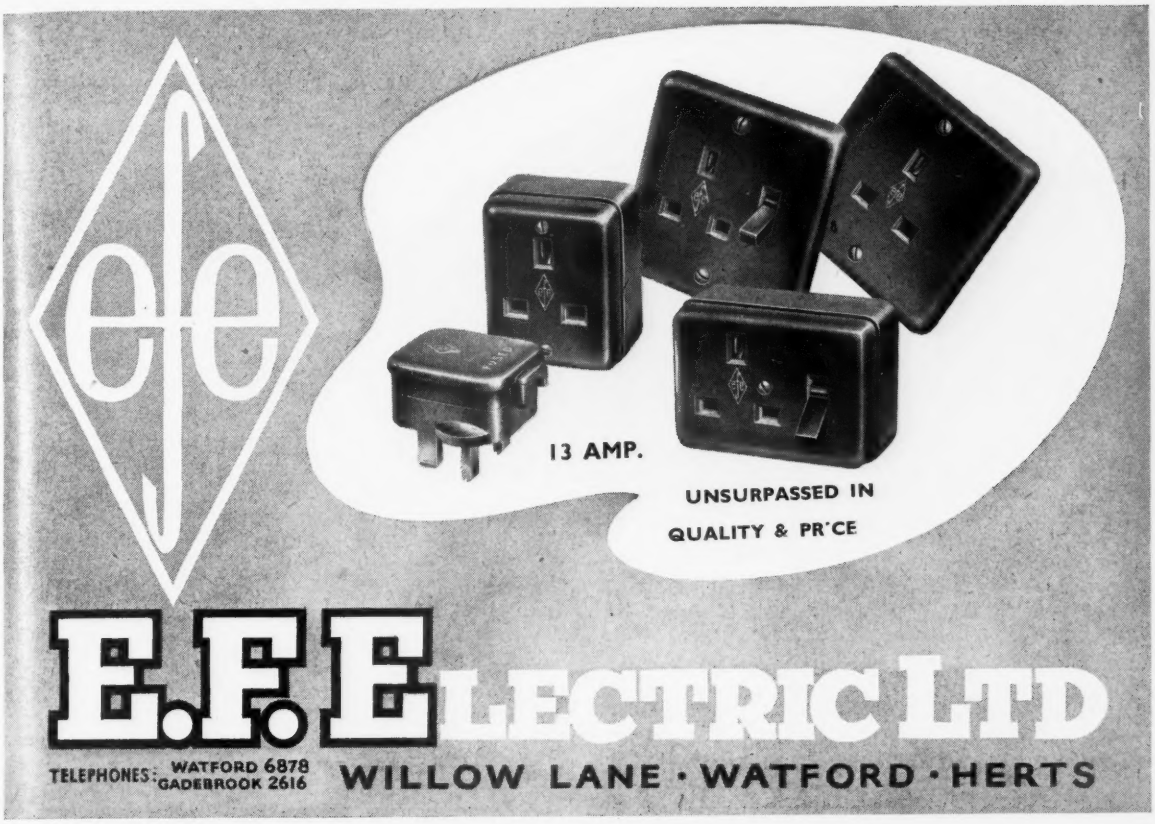

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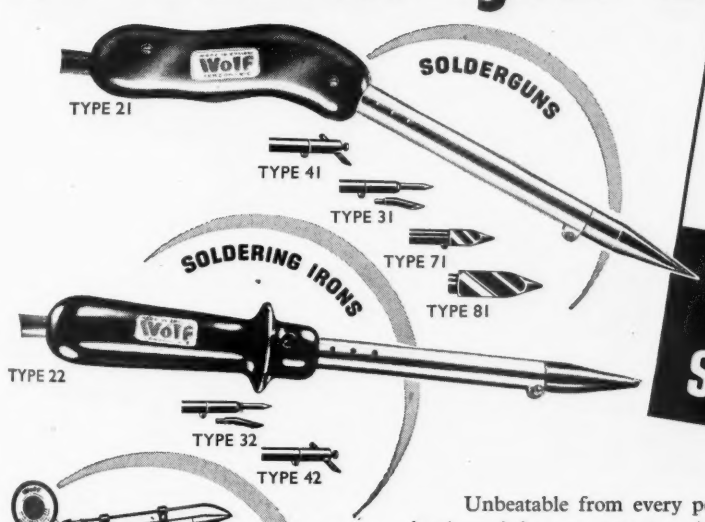

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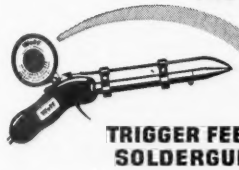

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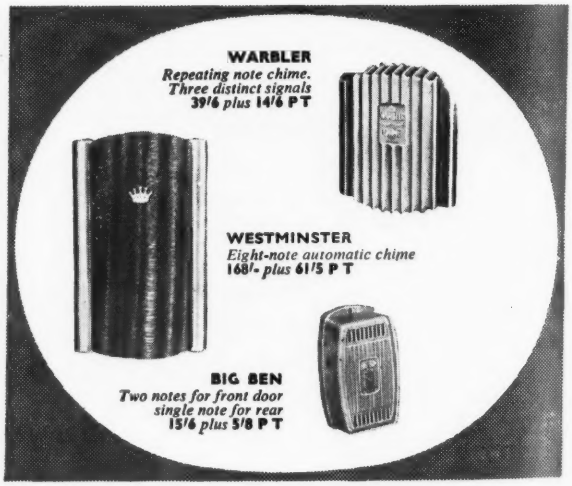
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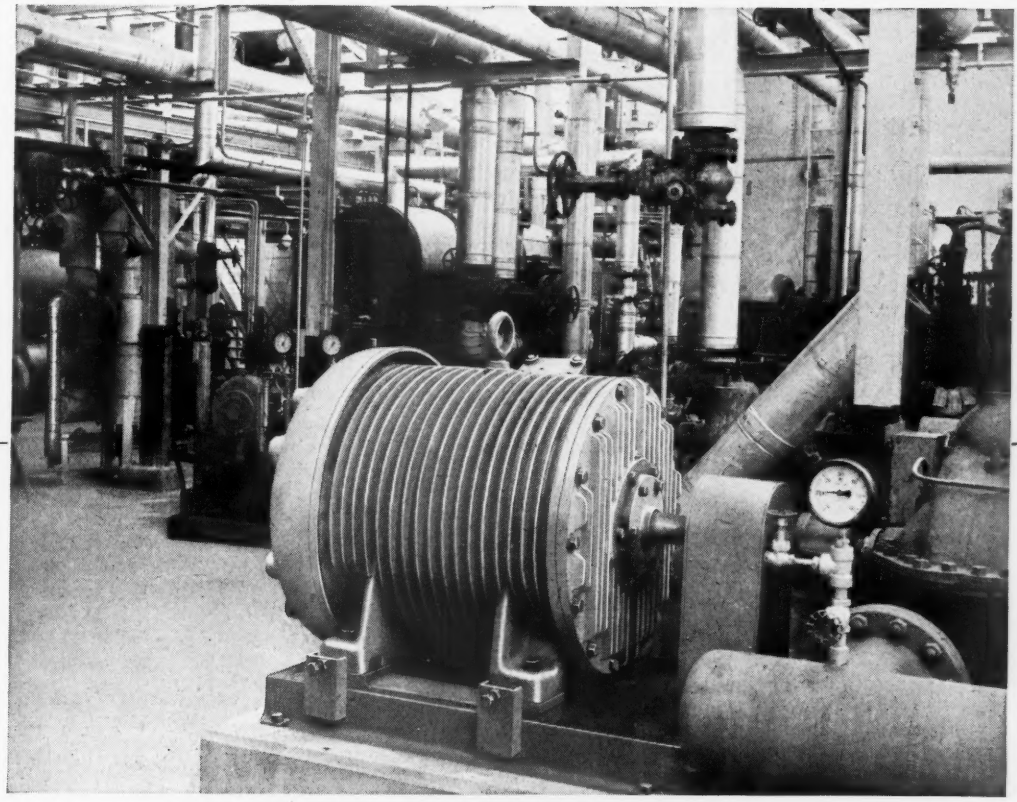
. . . . and of course

powerful transformers and attractive pushes to go with them.

Write for catalogue to

V&E **FRIEDLAND LTD**
MACCLESFIELD CHESHIRE

Flame-proof motors at Coryton Refinery



The ENGLISH ELECTRIC Company has supplied a considerable number of totally-enclosed, fan-cooled, flame-proof, squirrel-cage motors for use in The Vacuum Oil Company's Refinery at Coryton, Essex. These motors, which were delivered through The Lummus Company, have outputs ranging from 75 to 150 h.p., and the majority are used to drive pumps.

'ENGLISH ELECTRIC'

flame-proof motors

See also our Switchgear advertisement in this issue

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Industrial Motor Works, Bradford

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

BM. 29E4

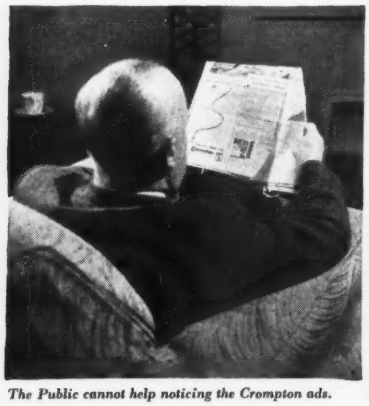
ADVERTISEMENTS SWING SALES

PUBLIC ASK FOR "CROMPTON"

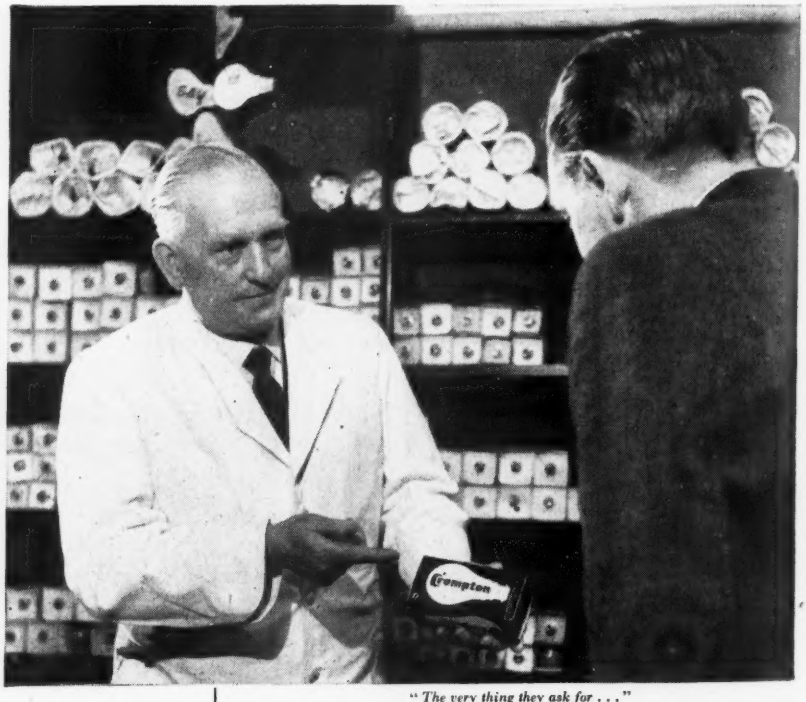
Crompton Parkinson's steady campaign — "Don't Say 'Lamps', Say Crompton" — has once again proved that advertising can alter the day-by-day sales pattern of the retailer.

The public cannot help noticing the Crompton advertisements. They ask for Crompton, and, in turn, retailers have been ready to supply their requests. All this has meant a steadily increasing turnover for the lamp side of the Crompton business.

A Birmingham retailer, independent and thriving after 30 years at the game, had this to say to his Crompton representative: "When my customers ask for a certain type of electric lamp, I like to be able to give it to them on the spot. I can, of course, always offer them an alternative, but that's not the way I like to work. I've built up the reputation of this shop on being able to give my customers the very thing they ask for."



The Public cannot help noticing the Crompton ads.



"The very thing they ask for . . ."

At the other end of the scale, the big Retailer too, has been affected by the advertising. One of them put it this way, "We only reckon to stock goods that are sufficiently popular with the public. We've had a lot of requests for Crompton, so naturally we've made sure of our Crompton stocks."

Many shops, too, have taken the trouble to use the Crompton point-of-sale material, bringing the actual advertisements to the eye of the customer at the moment of purchase. The general verdict seems to be that Crompton are doing a lot to brighten the shops this winter.

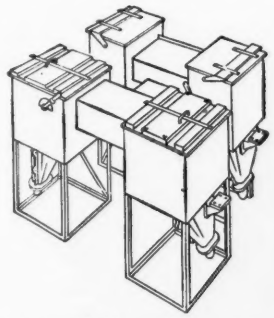
NEVER SAY 'NO'...

STOCK **Crompton**

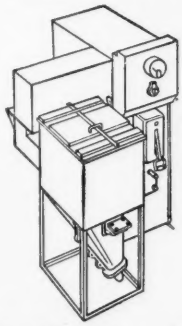
CROMPTON PARKINSON LTD., CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2. TEL: CHANCERY 3333

ADAPTABILITY

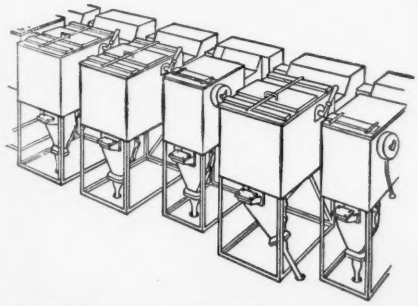
—an outstanding feature of this NEW unit



Non-extensible ring main arrangement

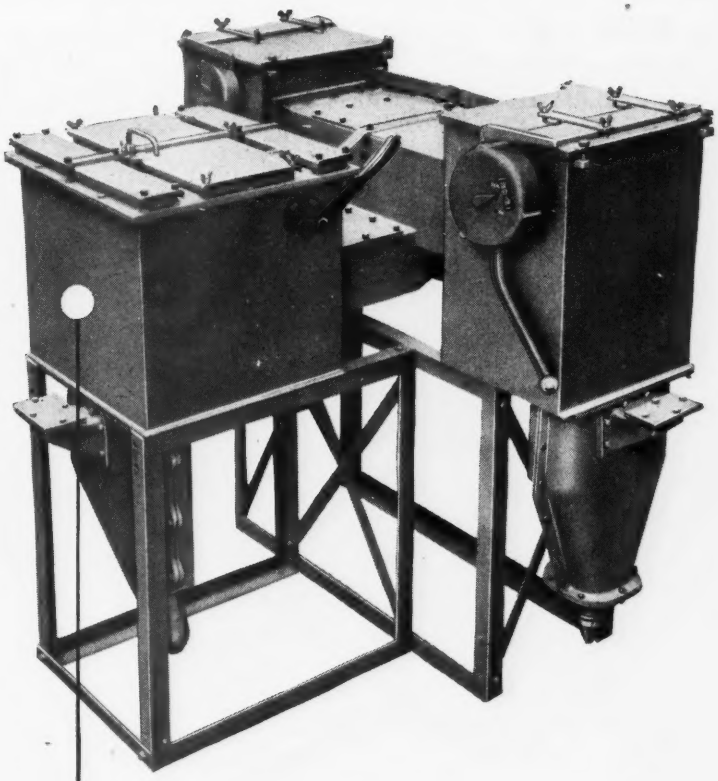


Combined 'OFS' and metalclad circuit-breaker unit



Extensible 'in-line' arrangement

Three of the many combined arrangements of the 'OFS' fuse-switch are shown above.



OFS

OIL—IMMERSED FUSE-SWITCH

On many occasions low initial cost is of paramount importance and does not permit the installation of the normal circuit-breaker type of HV switching equipment; to meet such cases, we are now offering the Type 'OFS' oil fuse-switch.

Designed for indoor or outdoor service this small, robust, steel-encased fully automatic unit is capable of controlling feeder and transformer circuits on 6·6 and 11 kV systems where the fault level does not exceed 250 MVA.

Fault currents are dealt with by three "trip all phases" HBC fuse-links mounted in a readily isolatable fuse carrier which is fully interlocked with a simple operating mechanism to ensure safe operation. Normal load currents can be interrupted or made on the fuse carrier contacts.

Combined with the "Ferguson Pailin" fully tested type 'IB 3' oil switch it provides an ideal ring main equipment which can be of extensible or non-extensible type. A variety of such arrangements is available to suit the cabling, operating and site layout conditions.

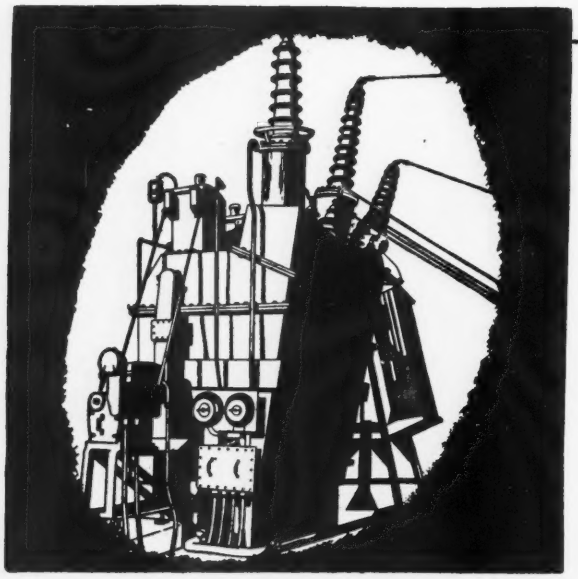
Ferguson Pailin LIMITED *for Switchgear*

Member of the A.E.I. Group of Companies

Head Office & Works: **HR. OPENSHAW MANCHESTER 11,** *Telephone :* DROylsden 1301 (Pte Branch Ex)

LONDON OFFICE : Bush House, Aldwych, W.C.2 BIRMINGHAM OFFICE : Windsor House, 656 Chester Road, Erdington, 23 GLASGOW OFFICE : Central Chambers, 109 Hope Street, C.2,

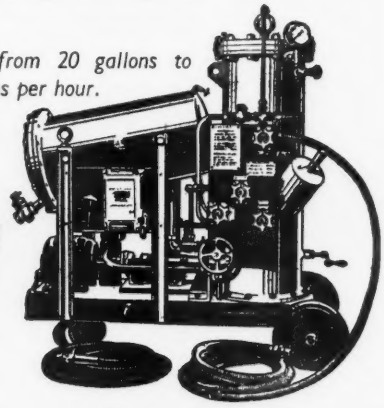
REPRESENTED IN PRINCIPAL OVERSEAS TERRITORIES



TRANSFORMER AND SWITCH OILS

Complete Drying and Purification giving Maximum Breakdown Voltage in one simple operation. No heating. No fire risk. Weatherproof. Fully mobile units. Used by leading Electricity Undertakings throughout the World.

Capacities from 20 gallons to 1,000 gallons per hour.



METAFILTRATION

THE METAFILTRATION COMPANY LIMITED
BELGRAVE ROAD, HOUNSLOW, MIDDLESEX

★ *PHONE: HOUNSLOW 1121/2/3*
GRAMS: METAFILTER, HOUNSLOW

MINERVA

ELECTRICAL INSULATING VARNISHES

STOVING VARNISHES (NATURAL RESIN TYPE)

STOVING VARNISHES (SYNTHETIC RESIN TYPE)

THERMO-SETTING VARNISHES

AIR-DRYING VARNISHES

CLOTH VARNISHES

CORE-PLATE VARNISHES
(STOVING AND AIR-DRYING)

COPPER-WIRE ENAMELS
(OLEO-RESINOUS AND SYNTHETIC TYPES)

All the above are supplied in black and clear.

ACID AND HEAT RESISTING ENAMELS
(AVAILABLE IN ALL COLOURS)

MICA BONDING VARNISHES

COIL STICKING VARNISHES

SLEEVING VARNISHES
(BLACK, CLEAR AND COLOURS)

CABLE LACQUERS
(NON-FLAM., CELLULOSE TYPE AND P.V.C.)

COMPOUNDS (VARIOUS TYPES)

All the materials listed conform to B.S. Specifications wherever applicable.

Our Insulating Varnish Department includes research and testing laboratories; the service of specialists is available to any manufacturer or engineer concerned with problems of insulating materials and their application.

PINCHIN JOHNSON & CO.

4 CARLTON GARDENS, LONDON, S.W.1. Tel.: TRA 5600

NEW! 5ft. FLUORESCENT FITTING TUBE & CONTROL GEAR

absolutely complete
INCLUDING PURCHASE TAX

£4·19·6

Wherever costs must be kept down — and a batten fitting is required — put up the Atlas "Popular". Meet the growing demand for fluorescent fittings with the Atlas "Popular Pack" *now*. It will make sales and save you time and money.

Well designed and sturdily constructed lighting unit with die-cast end caps.

Atlas 80w. Double-Life "White" tube — pleasing colour and highest efficiency.

80w. universal starter switch.

Class 'A' tapped choke — suits any A.C. mains 200-250v.

Easily fitted to any ceiling point — and so inexpensive!

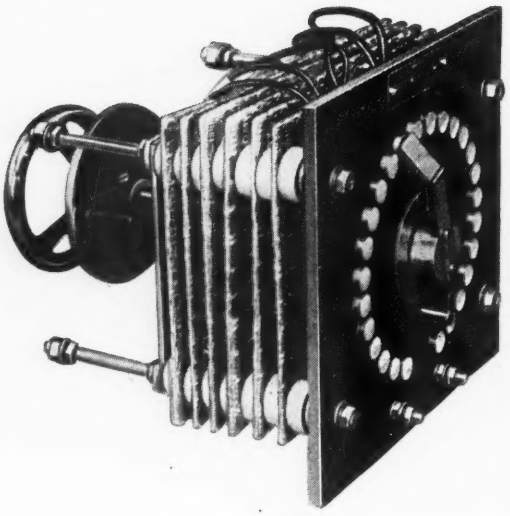
Order the ATLAS "POPULAR-PACK" through your usual supplier now.

THE ATLAS Popular Fluorescent Lighting PACK

Thorn

Full specification on request to Thorn Electrical Industries Ltd · Atlas Lighting Division · 233 Shaftesbury Avenue · London W.C.2

ELECTRICAL RESISTORS *and* HEATING ELEMENTS



STUD TYPE RESISTOR
BACK OF BOARD REVERSED
OPEN TYPE MODEL B.R.O.

Asbestos Woven Resistor Grids
Asbestos Woven Heating Nets
Battery Charging Resistors
Cartridge Heaters
Cubicle Heaters
Dimming Resistors Slate Wound
Dimming Resistors Tubular
Dimming Resistors Stud Type
Fixed Resistors Slate Wound
Fixed Resistors Tubular
Heating Elements Mica Wound
Heating Elements Porcelain Wound
Loading Resistors
Motor Operated Resistors
Resistor Units Mica Wound
Resistor Units Porcelain Wound
Stud Type Resistors Series
Stud Type Resistors Shunt
Stud Type Resistors Potentiometer
Sliding Resistors Slate Wound
Sliding Resistors Tubular
Strip Heaters Metal Cased
Toroidal Resistors

Write for appropriate lists

Birch

REGISTERED TRADE MARK

H. A. BIRCH & CO. LTD. WOOD STREET WILLENHALL • STAFFORDSHIR

Telephone: WILLENHALL 494-495. *Telegrams:* "WILOHM : WILLENHALL"
LONDON OFFICE : 33 SUDBURY COURT ROAD, HARROW. *Telephone:* BYRon 5120
NORTHERN OFFICE : 123 MANCHESTER ROAD, ACCRINGTON. *Tel.:* ACCRINGTON 4860
MIDLANDS OFFICE : 127 GREEN LANES, SUTTON COLDFIELD, B'HAM *Tel.:* ERDington 3765

Traffic directional signs bear the brunt of the weather — wet weather, frosty weather, tropical weather. Sealing and proofing vital electrical equipment is a job for BOSTIK Adhesives or PRESTIK Sealing Strip. Perhaps you have a problem that is just that much tougher than the ordinary run of problems involving adhesion or sealing. It will cost you nothing to let us know what it is and what we suggest should be done. There is a technical representative within easy reach of your premises.

Bostik

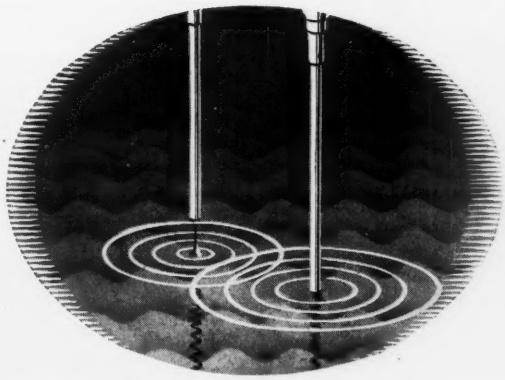
ADHESIVES & SEALING COMPOUNDS

PRESTIK
SEALING STRIP

'Bostik' is the registered trademark of
B. B. CHEMICAL CO. LTD., Ulverscroft Road, Leicester, *to whom all enquiries should be addressed*

No overflow . . .

No running dry



with

ELCONTROL

AUTOMATIC LEVEL CONTROLS

The Elcontrol system provides an important all round "fail to safety" feature—it can be arranged to leave the controlled circuit either "open" or "closed" as desired, in the event of breakdown.

A variety of probe fittings for bore holes, open or pressurised vessels, sumps, etc. are available.

Suitable for town or distilled water, condensate, sewage, industrial effluent, and many other liquids and their foams.

Control units for around **£12.**

For non-conductive liquids use the Elcontrol Proximity Switch.

Send for Data Sheets.

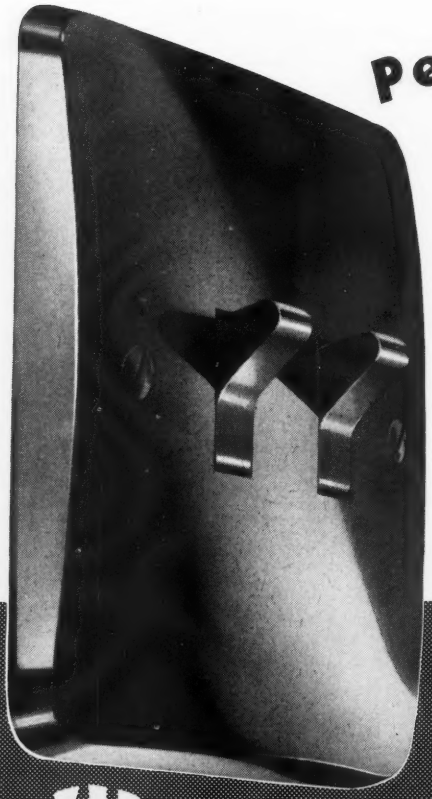
E
TRADE MARK
ELCONTROL LTD

10 WYNDHAM PLACE · LONDON W.1.

AMBassador 2671

MK 100
DHB

Performance★ Price★ Appearance★



the MK Plateswitch leads

Which of these three ranks first? No matter . . . the MK Plateswitch leads on every count. Certainly the Plateswitch is good: it has successfully completed 100,000 operations on full load in an independent test. It also costs less—less in terms of price; less in the time taken to fix it; and less because the enclosed movement needs no attention throughout its long life. The appearance speaks for itself.

★ *There are many other points of advantage too. Leaflet 227 describes them in detail.*

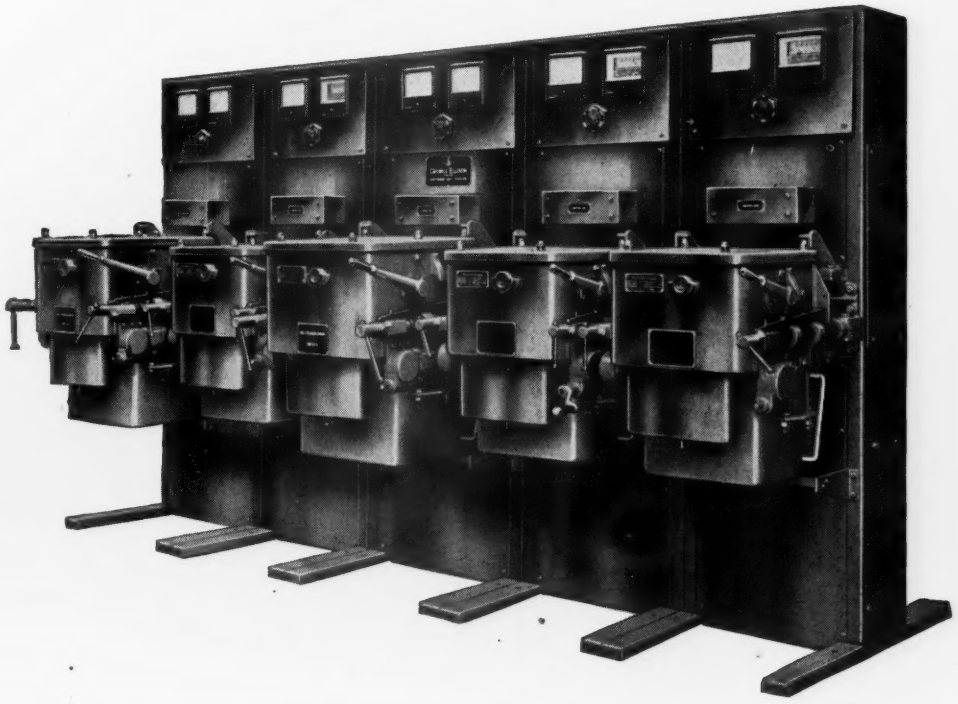
MK REGD

...the mark of leadership

M. K. Electric Limited, Wakefield Street, London N.18 *Edmonton* 5151

A.S.T.A. TESTED SWITCHGEAR

Complying with B.S. 116: 1952



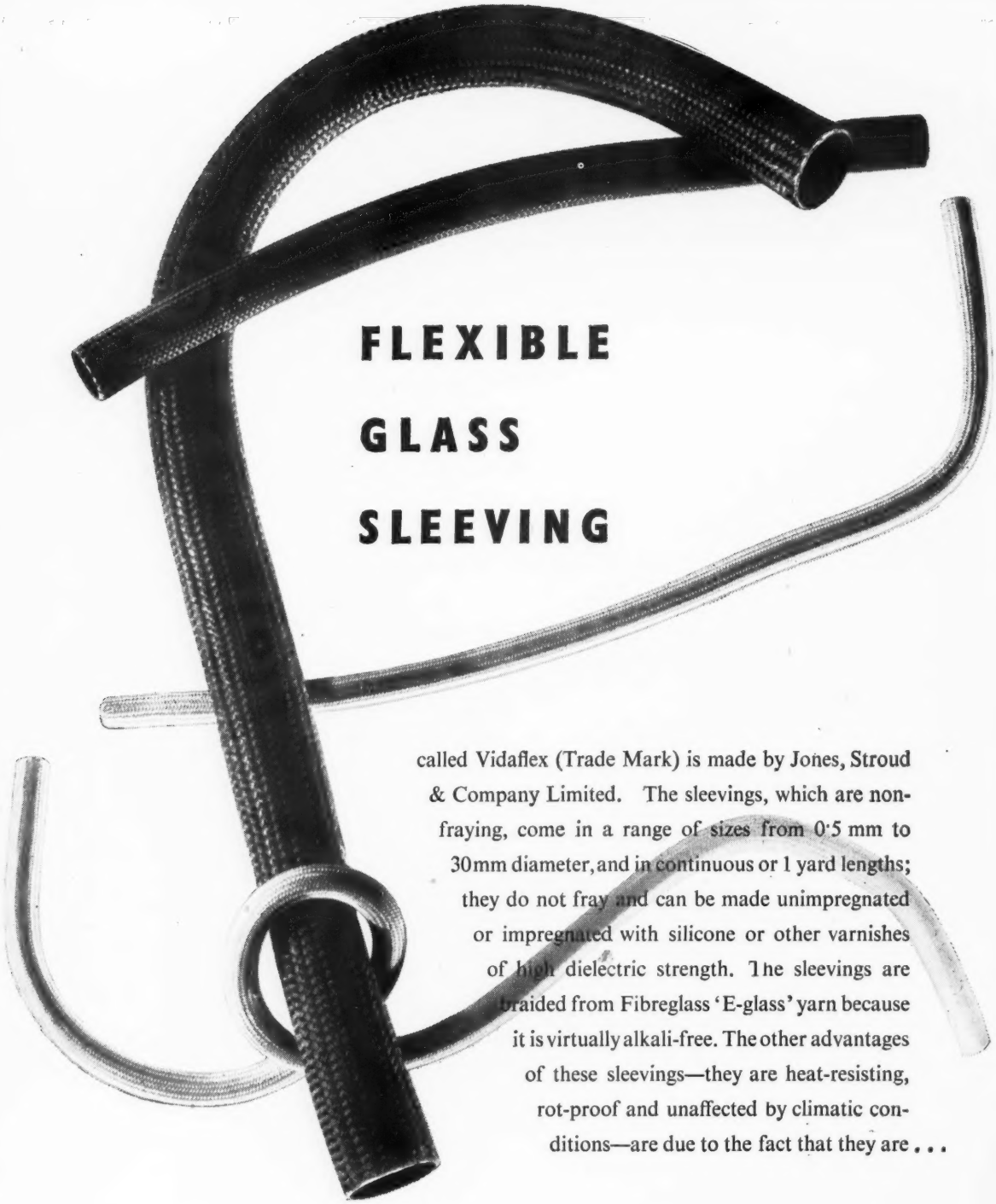
"ELLISON" 660 VOLT DISTRIBUTION SWITCHBOARDS are available with tested circuit breakers in current rating sizes of up to 2400 amps and 45 M.V.A. rated breaking capacity. They are designed for easy and safe maintenance and flush mounted instruments add to the clean appearance.

YOU CAN RELY ON AN ELLISON PRODUCT

Regd. Trade Mark

TRADE (E) MARK
GEORGE ELLISON
LIMITED
BIRMINGHAM ENGLAND

727



FLEXIBLE GLASS SLEEVING

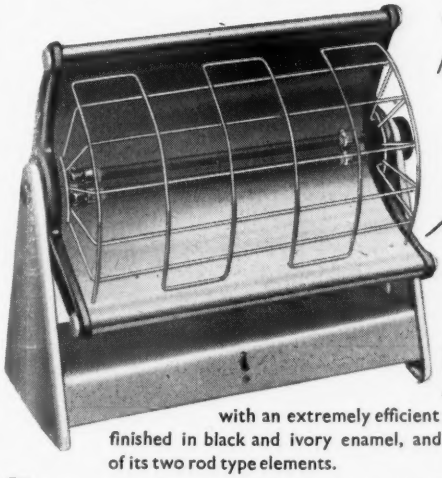
called Vidaflex (Trade Mark) is made by Jones, Stroud & Company Limited. The sleevings, which are non-fraying, come in a range of sizes from 0·5 mm to 30mm diameter, and in continuous or 1 yard lengths; they do not fray and can be made unimpregnated or impregnated with silicone or other varnishes of high dielectric strength. The sleevings are braided from Fibreglass 'E-glass' yarn because it is virtually alkali-free. The other advantages of these sleevings—they are heat-resisting, rot-proof and unaffected by climatic conditions—are due to the fact that they are . . .

. . . braided from FIBREGLASS TRADE MARK

FIBREGLASS LIMITED, Ravenhead, St. Helens, Lancs *(St. Helens 4224)*

Factories at St. Helens, Lancs and Possilpark, Glasgow

Three Fires by BNE

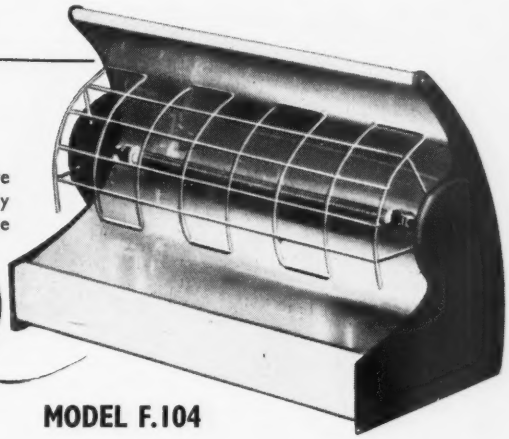


£7·17·1

MODEL F.103

A very good quality fire with an extremely efficient reflector. It is handsomely finished in black and ivory enamel, and has a switch to control one of its two rod type elements.

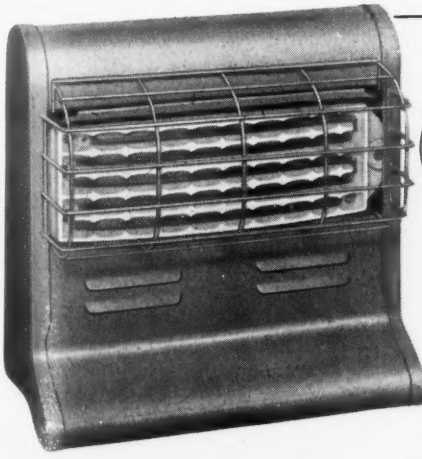
Dimensions: 16″ high; 18¾″ wide; 11½″ deep.
Loading: 2 kW. Price includes P.T.



£3·8·4

MODEL F.104

A robust single-rod type reflector fire with a hard-wearing ivory and chocolate enamel finish.
Dimensions: 11¼″ high; 16⅜″ wide; 7⅛″ deep.
Loading: 1 kW. Price includes P.T.



£2·14·8

MODEL F.101

A sturdy general purpose fire of pressed steel construction, finished in florentine bronze.
Dimensions: 10½″ high; 11″ wide; 6¾″ deep.
Loading: 1 kW. Price includes P.T.
MODEL F.102 as above but 2 kW. **£3.18.7**

BRITISH NATIONAL ELECTRICS LTD.

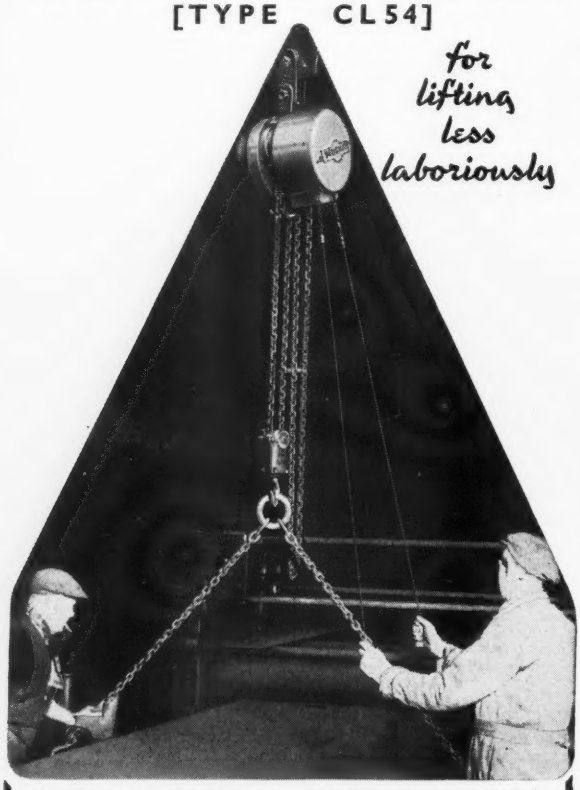
Domestic Appliance Section of JOHNSON & PHILLIPS LTD.

NEWARTHILL · MOTHERWELL · SCOTLAND

Vaughan *Powerlift*

HOIST BLOCKS
[TYPE CL54]

for lifting less laboriously



½ TON £79 | ¾ TON £86 | 1 TON £89 | 1½ TON £98

FOUR BASIC SIZES

Prices shown are for 3-phase A.C. with 10ft. hook to hook lift.

DISPATCH EX-STOCK

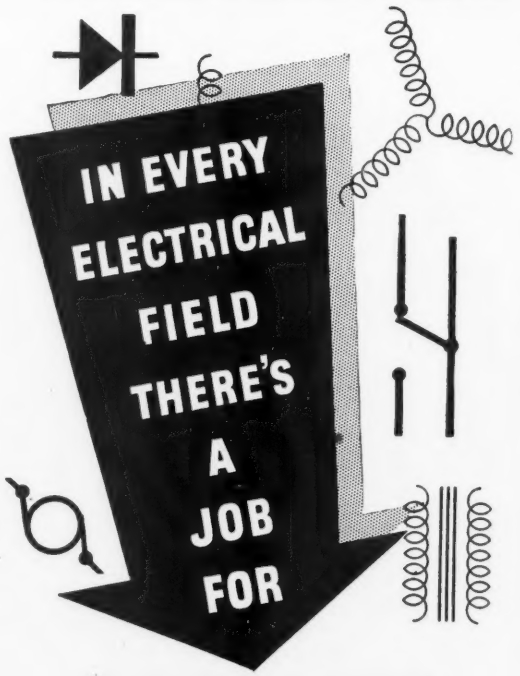
Prices of Travelling Trolleys and other details on application.

THE VAUGHAN CRANE CO. LTD.
MANCHESTER 12 : : : ENGLAND

Telephone EASt 1473

Makers of fine cranes for over seventy years.

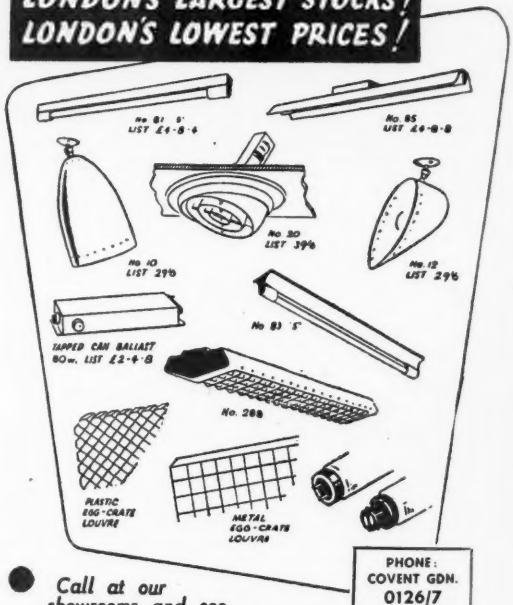
Vaughan



BAKELITE
TRADE MARK
LAMINATED

BAKELITE LIMITED · 12-18 GROSVENOR GARDENS · LONDON · SWI
Telephone Sloane 0898
L40

LONDON'S LARGEST STOCKS!
LONDON'S LOWEST PRICES!



PHONE: COVENT GDN. 0126/7

Call at our showrooms and see for yourself.

LUMITRON LTD

FLUORESCENT MANUFACTURERS AND FACTORS
180 SHAFTESBURY AVENUE, W.C.2

NOT EVEN A SCREWDRIVER!

Just a flick with the thumb and the fuse is ready for changing

★ NO DANGER OF LOOSE CONNECTIONS
★ TO B.S.S. 1363

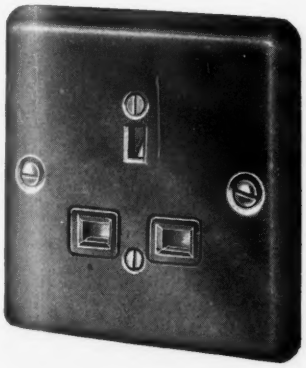
THE D.S. PLUG

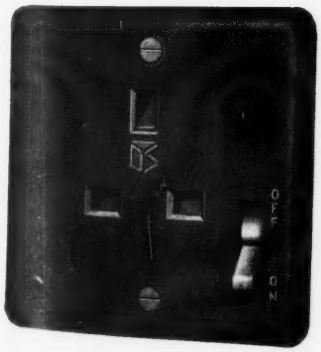
With the hinged pin
Pat. No. 638780

Illustration shows the hinged pin opened to reveal the fuse

The plug cannot be inserted in the socket unless the hinged pin is closed again

Made in Brown Non-Track Plastic Moulding, Cat No. DS/16. Also in White, Cat. No. DS/16W





The D.S. Shuttered Sockets

★ Porcelain Back Insulator
★ Minimum Projection for Easy Wiring
★ Supplied either for Surface, Flush, or Conduit Box Fitting Insulated or Metal Front Plates
★ Unswitched or Switched Models
★★ Switched Models have a break on each pole

Competitive Prices

by

D.S. PLUGS
LIMITED
MANCHESTER 5

A member of the Dorman Smith Group of Companies

LONDON OFFICE & EXPORT DIVISION: 125, HIGH HOLBORN, LONDON, W.C.1

GLASGOW BELFAST LEEDS *Also at* CARDIFF NEWCASTLE BIRMINGHAM

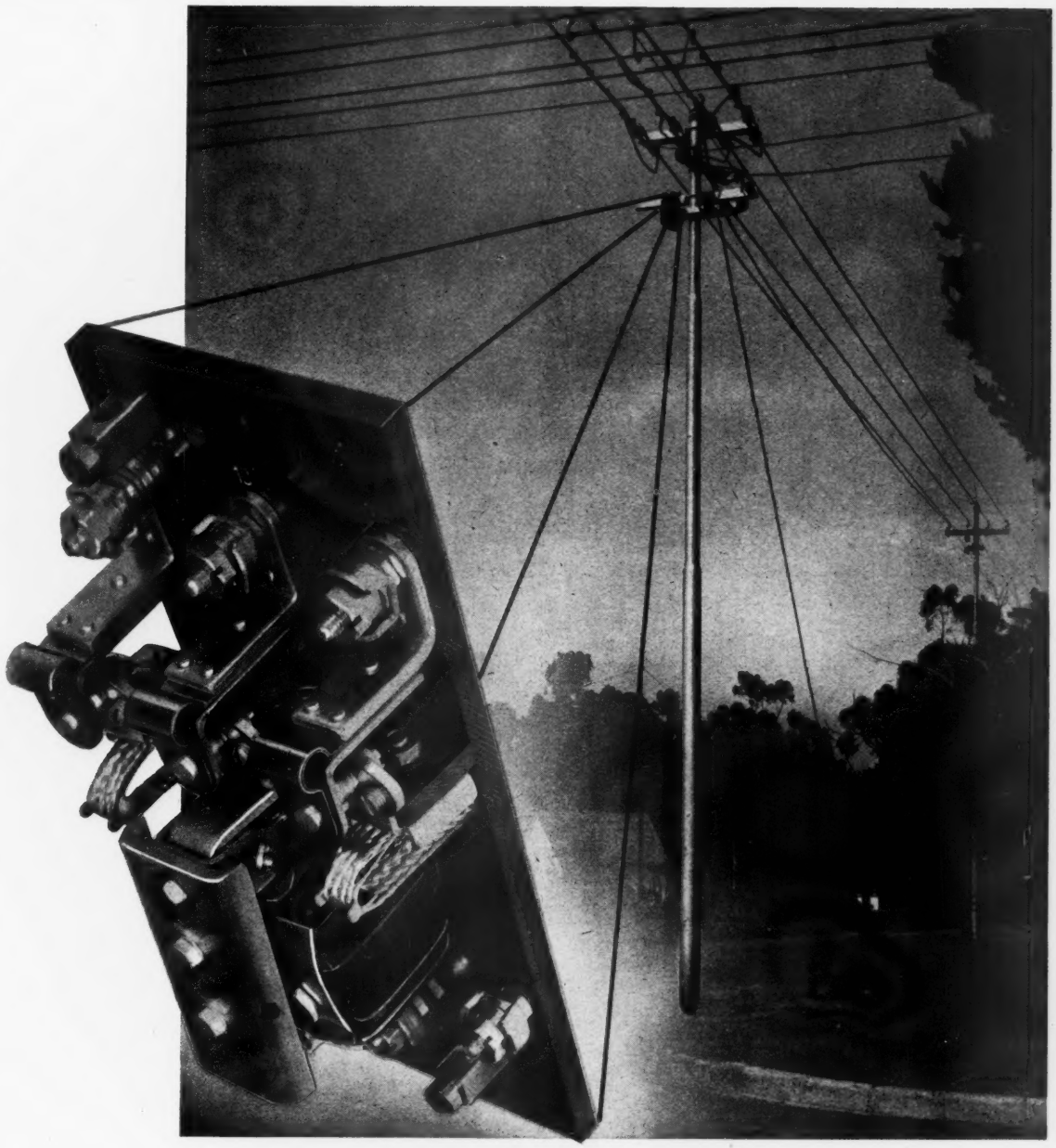
LIGHTING

In public halls and civic assembly rooms the need for emergency lighting is now accepted. In future buildings of this sort the stand by electrical system will be planned at the same time as the main lighting is planned. Chloride Batteries Ltd. makers of Keepalite, the automatic emergency lighting system, offer the advisory services of their engineers to architects and electrical contractors in any part of Britain.

Keepalite

FOR PUBLIC HALLS

A Product of Chloride Batteries Limited, Exide Works, Clifton Junction, Swinton, Manchester and Grosvenor Gardens House, Grosvenor Gardens, SW1 S.73A



"Satchwell" Contactors for Street Lighting Control

"SATCHWELL"

- Satchwell Contactors have successfully withstood severe tests simulating 50 years of normal duty —a positive guarantee of reliability!
- In addition they are renowned for exceptional quietness in operation, their small size and almost negligible maintenance.
- They are used extensively for control of heating loads in conjunction with 'Satchwell' thermostats, direct switching of small electric motors, street lighting control and numerous other applications. The photograph shows an RA3 triple pole contactor mounted on a pole and is reproduced by courtesy of the Municipality of Somerset West, C.P., South Africa.

MANUFACTURERS OF HIGH QUALITY CONTROL INSTRUMENTS FOR OVER THIRTY YEARS

THE RHEOSTATIC COMPANY LIMITED

Telephone : SLOUGH 23311 (6 lines)

SLOUGH

Telegrams : RESISTANCE, SLOUGH

THE BUDGET CASE...

The installation of new equipment is encouraged by the Budget this year. Now is the time to invest in Photo-electric controls. They show a good return — production costs are reduced and unfailing accuracy is obtained. Photo-electric controls are not expensive, for the money saved and the precision acquired are considerable. Most large companies use them for a hundred-and-one mechanical operations.

Please consider the following range of equipment and let us know your special problem.

RADIOVISOR
EST. 1927

THE FIRST NAME IN PHOTO-ELECTRIC CONTROLS

RADIOVISOR PHOTO-ELECTRIC & ELECTRONIC CONTROLS include:

FLAMESTAT FLAME FAILURE CONTROL
SMOKE ALARM
PHOTO-ELECTRIC RELAY
SMOKE DENSITY INDICATOR
COUNTING AND BATCHING UNIT
INVISIBLE RAY BURGLAR ALARM
TURBIDITY EQUIPMENT
HOPPER & BUNKER LEVEL CONTROL
PRINT REGISTRATION
PHOTO-ELECTRIC SAFETY GUARD
FACTORY LIGHTING CONTROL
AUTOMATIC DOOR OPENING
AUTOMATIC RADIATION PYROSTAT

Further particulars from:

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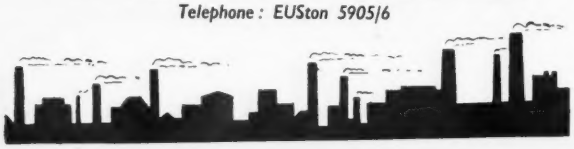

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LITTLE MORETON HALL, near Congleton, is one of the finest specimens of a black-and-white sixteenth century house. It has a moat and an elaborate system of concealed passages.

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PROTECTIVE WAXES
The name to watch in waxes

WHITEHEAD CHEMICAL CO. (WAXES) LIMITED
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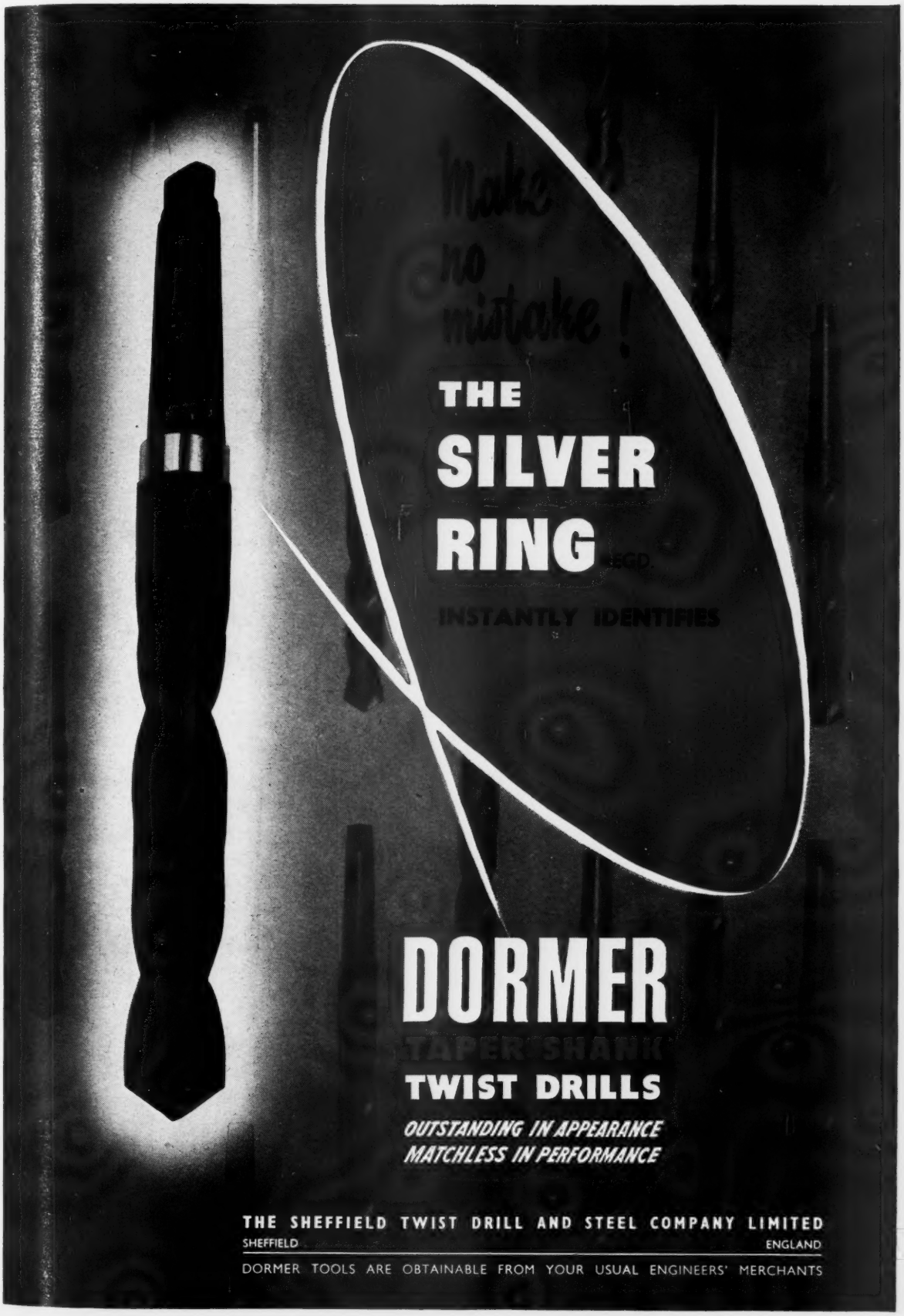
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THE
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INSTANTLY IDENTIFIES
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OUTSTANDING IN APPEARANCE
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THE SHEFFIELD TWIST DRILL AND STEEL COMPANY LIMITED
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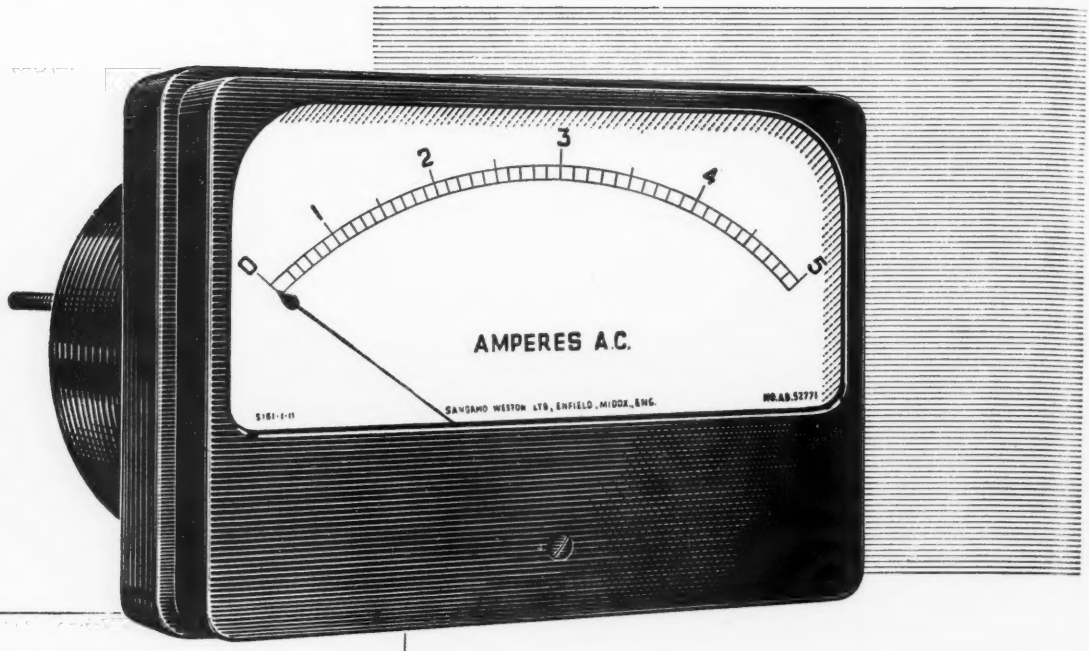
DORMER TOOLS ARE OBTAINABLE FROM YOUR USUAL ENGINEERS' MERCHANTS



WESTON ELECTRICAL INSTRUMENTS INCLUDE:–

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ROUND, RECTANGULAR AND EDGEWISE SWITCHBOARD AND PANEL INSTRUMENTS

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THE WESTON RANGE OF RECTANGULAR INSTRUMENTS

These instruments, giving the advantage of long, easily read scales, are designed to harmonize with rectangular panels and are offered in a variety of types and scale ranges.

Supplied as D.C. moving coil, A.C. rectifier and H.F. thermocouple types; also A.C./D.C. moving iron types. Four sizes are available with scale lengths of 2·5″, 3·2″, 4·2″ and 6·25″.

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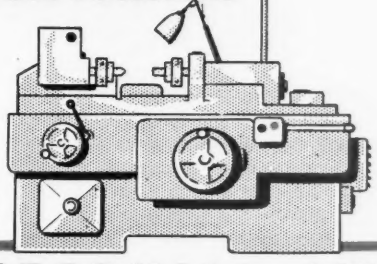
the modern system of electric power distribution

a question of movement

We do not suggest that your machine shop is a roundabout, but your plant engineer knows only too well the problems which arise when re-arranging existing machines or installing new ones. But if he is wise he will solve one of his major problems by installing Busbar Trunking, the modern system of electric power distribution which minimises production hold-ups and eliminates temporary or make-shift power connections. Standard Ratings: 175, 250, 300, 400, 500 and 600 amps.



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Sales Office: 1 VICTORIA STREET LONDON SW1 Tel.: ABBEY 5095/6 Grams: BUSBAR SOWEST

Works: The Otter Mill, Ottery St. Mary, Devon. Tel.: Ottery St. Mary 264. Grams: Busbar Ottery St. Mary.

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covers all insulation

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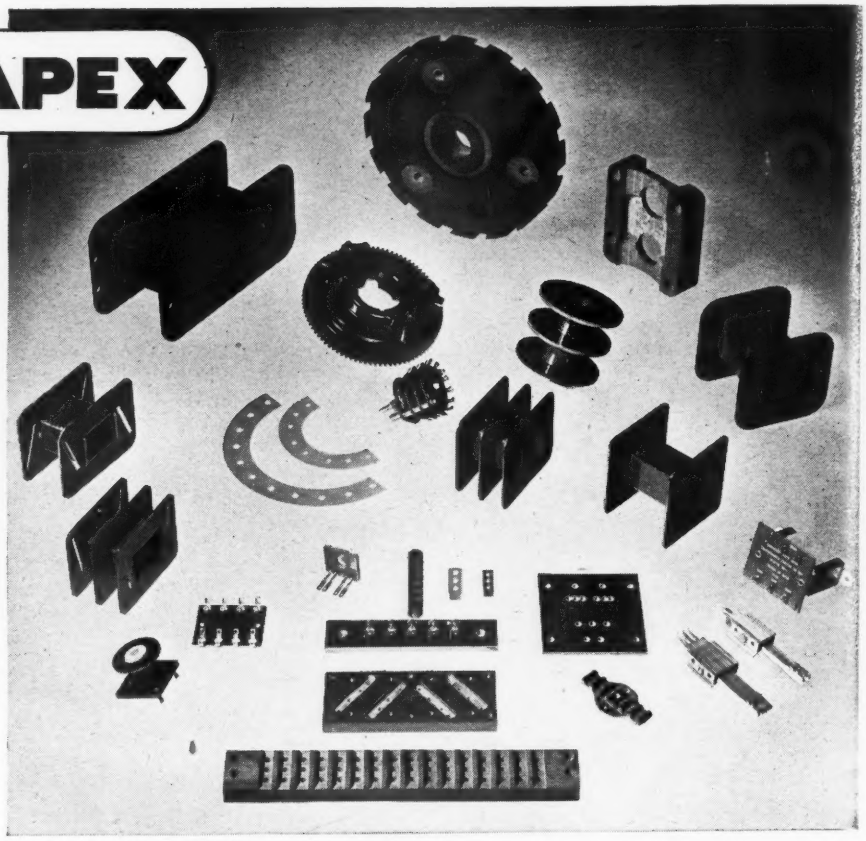
"Formapex" electrical insulation has exceptional machining and mechanical qualities and is available in flat sheets and panels, round and rectangular tubes, machined parts, punchings, etc. It is highly resistant to moisture, dilute acids and organic liquids.

Full information and samples will be sent gladly on request.



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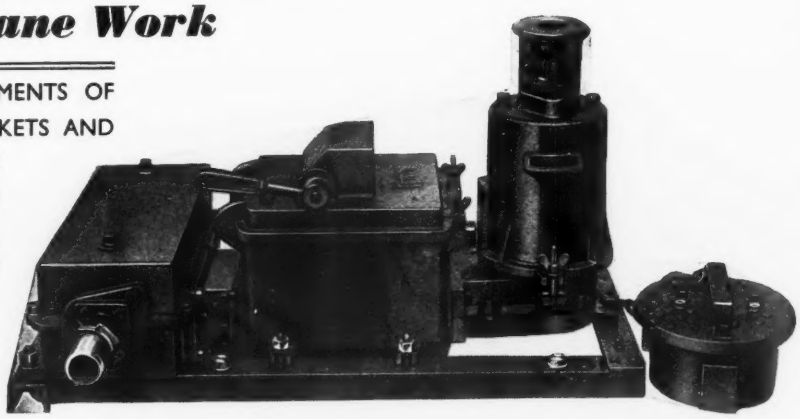
Watertight Plugs and Sockets for Outdoor Crane Work

THERE ARE SEVERAL ARRANGEMENTS OF WEEKES' W/T PLUGS AND SOCKETS AND ONE OF THE MODIFIED FORMS IS THAT DESIGNED FOR USE WITH A TRAVELLING CRANE.

The travelling crane passes directly over the plug and socket, and the slack in the flexible trailing cable is wound on a drum, thus making it unnecessary to un-plug and re-connect when the crane passes the plug point. The plug and socket swing through a maximum angle of 220°.



THIS DOCK PLUG IS FOR INSTALLATION IN A PIT, OR ON GROUND LEVEL

All designs of Weekes' Watertight Plugs and Sockets can be made in ratings up to 300 amps. 500 volts, with two, three or four contact pins.

Advise us of your requirements; we can probably meet every one of them.

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Heavy Duty

DISTRIBUTION VALVE TYPE

Arresters

(World patents applied for)

FULLY INSULATED INCOMING CONNECTION & PORCELAIN CAP

No phase to phase faults due to tree branches or birds.

Long tail surge current rating established by routine test

with 500 and 1000 microsecond R.C. test waves

- High current discharge capacity up to 65,000 amps.
- Unity impulse ratio.
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- Available in standard A.I.E.E. and B.S. ratings from 3 to 37 kV.

GRADED SAFETY DISCONNECT DEVICE IN EARTH LEAD

Maintenance of service continuity. Prevention of Line fuse operation.

Fitted with mounting bracket for steel or wood crossarm including NEMA standard type.

EMP ELECTRIC LTD.

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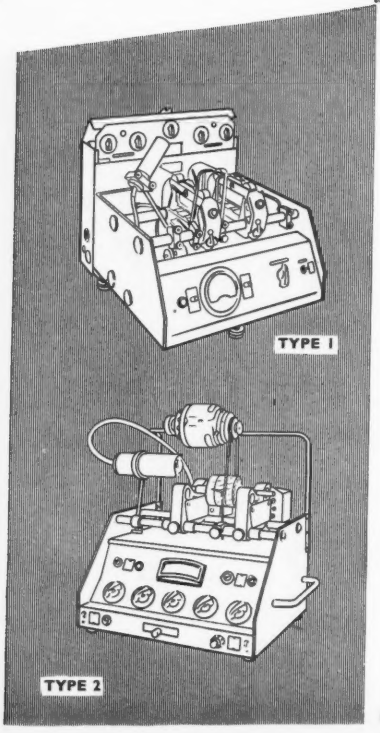

TYPE 3B STROBOSCOPE (Above) An instrument for the measurement of speed and observation of rotary or reciprocating mechanisms. High intensity white light source. Detachable lamp. A direct reading speedmeter.

TYPE 1 BALANCING MACHINE (Top left) A bench mounting instrument of the strobodynamic type for the detection and measurement of unbalance forces in rotating bodies.

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Managements, designers and plant engineers will readily appreciate the advance of electronic aids in maintenance and manufacturing processes with its wide application in every branch of industry. Details of the complete range of E.M.I. electronic equipment which may solve your problems are available from:—

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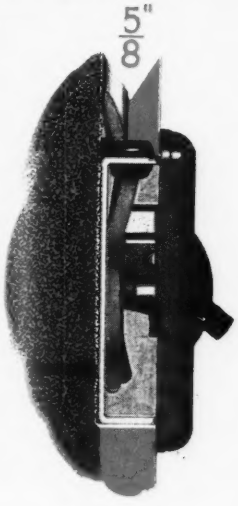
EG16

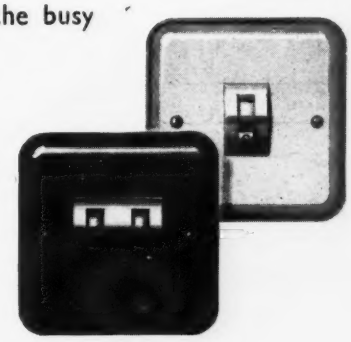
THE "LINCOLN" TYPE AC – A TRUE *PLASTER-DEPTH* SWITCH

How deep is Plaster Depth?

Compared with the generous plastering of earlier days, the recommended depth of $\frac{5}{8}$ in. for modern two-coat work* may seem decidedly shallow. Yet even within this depth of plaster the "Lincoln" Type AC switch can be erected as a fully flush point without the need to cut or chase the brickwork. The "Lincoln" Type AC is, in fact, a genuine plaster-depth switch with boxes suitable for either flexible cable or conduit. In addition to its many electrical and mechanical advantages, the "Lincoln" Type AC is therefore a great time-saver to the busy wireman.



*See British Standard Code of Practice, CP 211 (1949)



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"Crabtree" (Registered)

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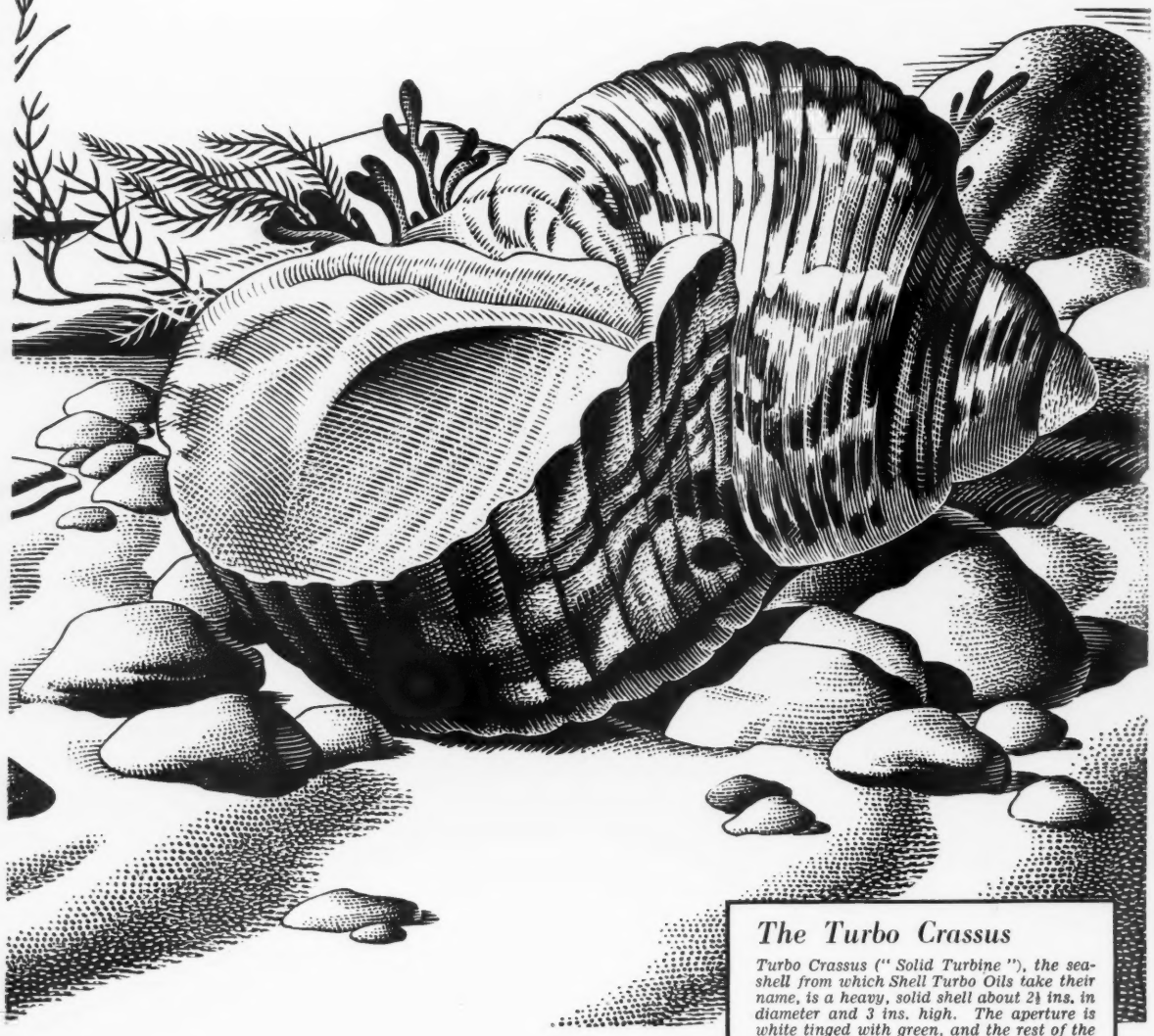
Specialised lubrication for industry



The Turbo Crassus

Turbo Crassus ("Solid Turbine"), the seashell from which Shell Turbo Oils take their name, is a heavy, solid shell about 2½ ins. in diameter and 3 ins. high. The aperture is white tinged with green, and the rest of the shell is dirty white or greenish, with angular black or brown patches on the ribs. Turbo Crassus is found off the coast of North Australia and New Caledonia. Shell Turbo Oils are part of the wide range of Seashell Oils, all of which are named after seashells.

Shell Turbo Oils

Shell Turbo Oils are specially recommended for steam, gas and water turbines, bearings of high speed enclosed crankcase steam engines, and certain other circulating systems where oils of turbine quality are required. Shell Turbo Oils are approved by all the leading turbine manufacturers.

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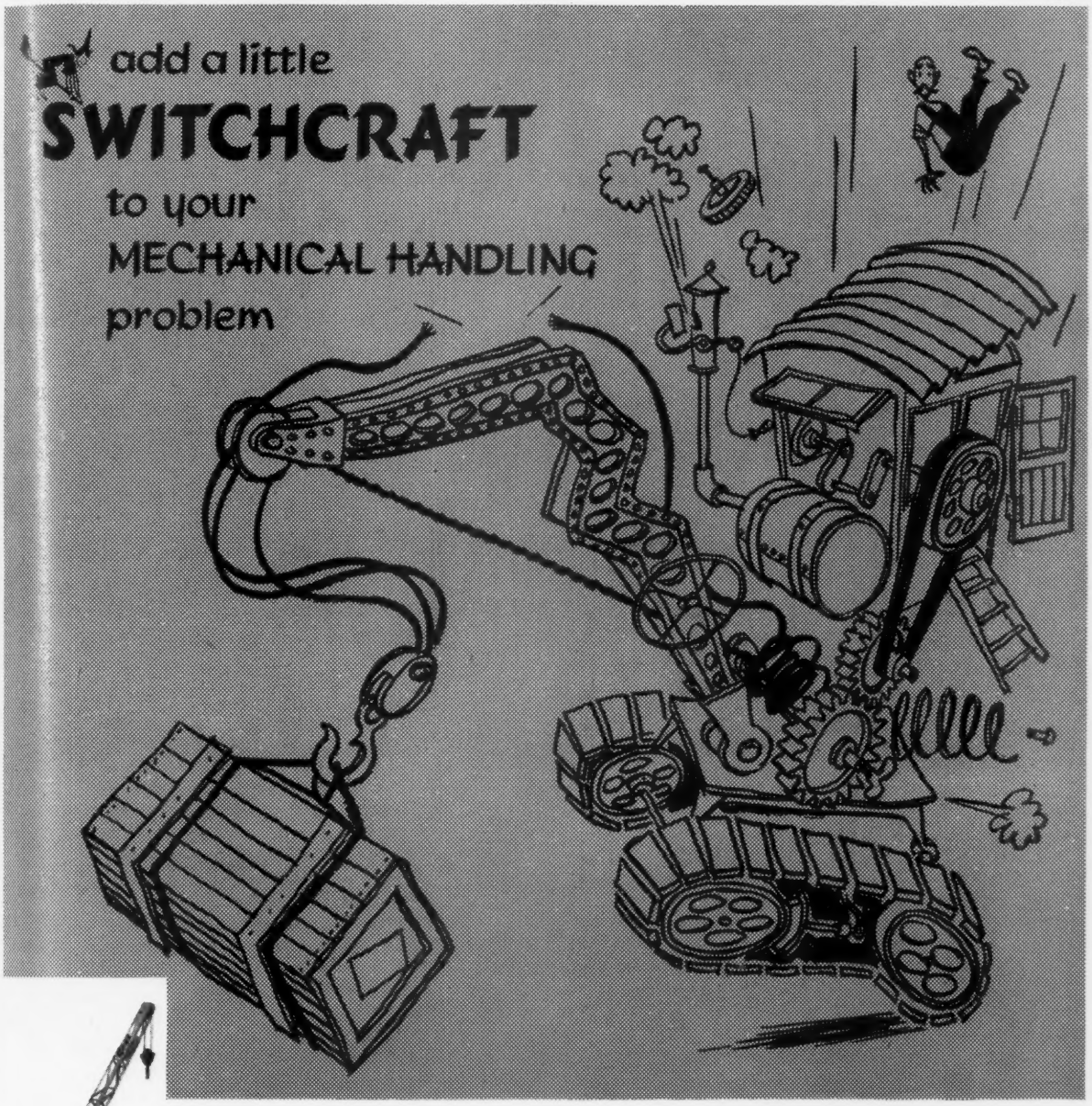
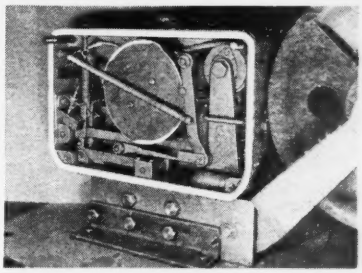
LEADERSHIP IN LUBRICATION

add a little
SWITCHCRAFT
to your
MECHANICAL HANDLING
problem

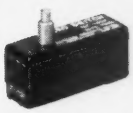


BURGESS MICRO-SWITCHES are used in manifold ways by a large number of Manufacturers of Mechanical Handling equipment. A good example is to be found in the Automatic Safe Load Indicator Mk. 3 here illustrated (with front cover removed) which is fitted by Steels Engineering Products Limited to many of their 'Coles' mobile cranes.

This ingenious unit safeguards both operator and machine by "cutting-out" the hoisting and derricking-out motions when a load becomes unsafe. It also provides warning of the approaching "cut-out" position so that the operator may ascertain the maximum safe radius of the derrick for the respective load. These facilities are provided by type CRS BURGESS MICRO-SWITCHES mounted in the unit and operated by levers in the manner evident from the photograph.



The type CRS BURGESS MICRO-SWITCH is a sensitive model provided with a spring plunger actuator. Full details of this and many other models are to be found in our CATALOGUE No. 50/C.



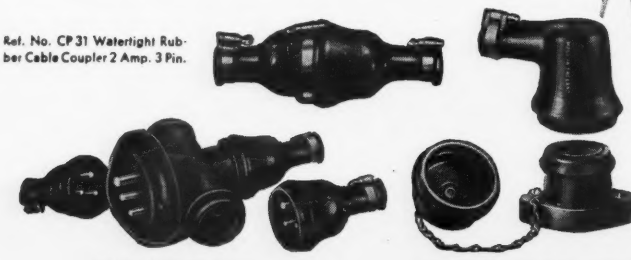
BURGESS MICRO-SWITCHES
Industry's Automatic Choice

BURGESS PRODUCTS COMPANY LIMITED
Micro-Switch Division, Dukes Way, Team Valley, Gateshead 11. Tel. : Low Fell 75322 (3 lines)

SETTLE for NETTLE

The new NETTLE range of Weatherproof Rubber-clad Couplers, Sockets and Plugs is fully described in a new leaflet now available. A few typical items from this range are shown below. Write to-day for full details.

Ref. No. CP31 Watertight Rubber Cable Coupler 2 Amp. 3 Pin.



Ref. No. A133 Weatherproof 3-way Rubber Socket Adaptor 5 Amp. and 2 Amp.

Ref. No. P32 and SP32 Weatherproof Batten Socket and Plug Top Side Entry, 2 Amp. 3 Pin.

*Also available, the comprehensive Nettle Catalogue containing details of the full range of **NETTLE** Shockproof Electrical Accessories. You are invited to write for a copy.

NETTLE ACCESSORIES LTD.
HARPER ROAD · WYTHENSHAWE · MANCHESTER

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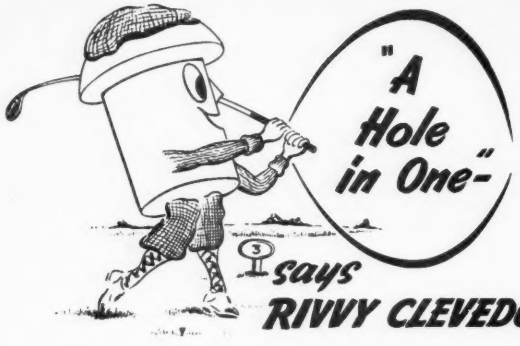

"Yet, conversely, I'm NEVER below par.

You can 'putt' your trust in me, as many a 'birdie' will tell."

solid rivets in aluminium, brass, copper, nickel and all light alloys . . .

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For high and low voltage testing. Standard Model: range 100/850 volts A.C. or D.C. Dual Model: range 1/30 and 100/850 volts A.C. or D.C.

16-page Manual (How to make 50 electrical tests). 1/- post free. Write for leaflet 25F.

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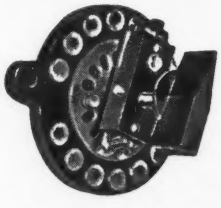
NEW!!

15-WAY ROTARY SWITCH



Adjustable from 1 to 15 way

THE SWITCH for Transformer Tapping Control

15 amp. – 30 amp.

S.P. – D.P. – T.P.

HENLEY, BURROWES & CO.

Kings Norton, Birmingham

HARLAND INDUSTRIAL MOTORS

onerous duties demand . . .

. . . a reliable, efficient motor from the Harland range. They can be supplied to suit a variety of operating conditions and in any normal enclosure to meet the requirements of all types of drive. Standard models are designed to operate on any normal low tension three phase supply and are suitable for use where there is a voltage variation of plus or minus 5%.

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THE HARLAND ENGINEERING CO LTD *WORKS* · ALLOA SCOTLAND

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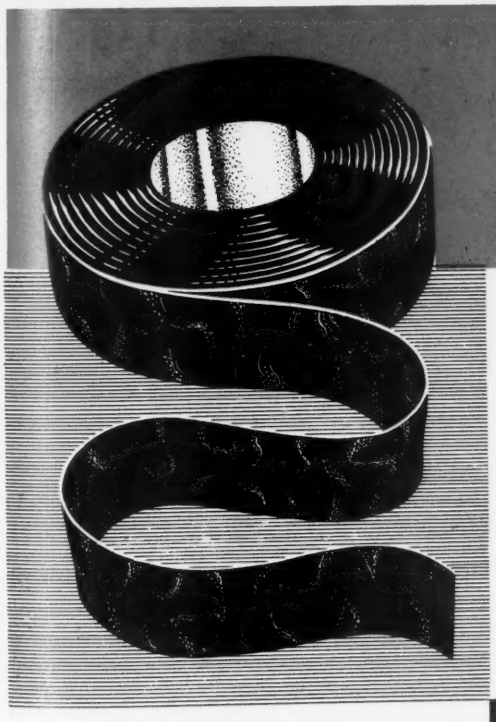

Glass MICA TAPES

This Electrical Insulating Material combines High Dielectric and High Tensile Strength with Flexibility.

Available in 25-yd., 36-yd. and 50-yd. rolls in widths from $\frac{3}{8}$" upwards, with Bitumen, Synthetic or Natural Gum Bonds.

We can offer Prompt Delivery at Competitive Prices, and shall be pleased to receive your enquiries for all types of Mica Tapes.

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ESTD. 1912

PERKINS DIESEL ENGINES *for* GENERATING SETS

WITHIN RANGE OF 8½ TO 55 K.W.

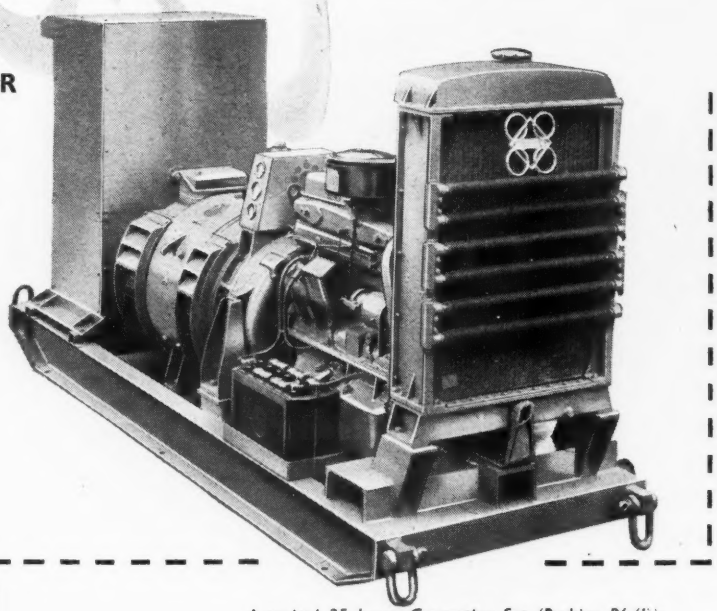
TABLE OF RATINGS AND CAPACITIES:

ENGINE		P3 (I)	P4 (I)	L4 (I)	P6 (I)	S6 (I)
GENERATOR EFFICIENCY		80%	81%	83%	84%	85%
SPEED OF ENGINE	CURRENT					
1000 r.p.m.	50c A.C. or D.C.	8½ k.w.	12½ k.w.	18 k.w.	20 k.w.	30 k.w.
1200 r.p.m.	60c A.C. or D.C.	10 k.w.	15 k.w.	22 k.w.	24 k.w.	37½ k.w.
1500 r.p.m.	55c A.C. or D.C.	13 k.w.	18½ k.w.	27 k.w.	30 k.w.	45 k.w.
1800 r.p.m.	60c A.C. or D.C.	15½ k.w.	21½ k.w.	30 k.w.	35 k.w.	55 k.w.

K.W. outputs are for 12-hour continuous operation at altitudes not exceeding 500 feet and ambient temperature of 85° F. For 24-hour continuous operation they should be reduced by 10%, also by 2% for every 10 F. by which the ambient temperature exceeds 85°F., and by a further 4% for every 1,000 feet above 500 feet. When generator efficiency varies from above, capacity should be adjusted to suit. Specification details of engine sent on request.

★ POINTS IN FAVOUR

- (A) Power standardization for all applications.
- (B) World-wide availability of spares and service facilities.
- (C) Absolute reliability in all conditions of work.
- (D) Diesel economy.
- (E) Easy starting.
- (F) Low maintenance costs.



A typical 25 k.v.a. Generating Set (Perkins P6 (I)). (203/120 volts A.C., 3 phase, 4 wire, 60 cycles).

Perkins HIGH QUALITY DIESELS AS SUPPLIED IN GENERATING SETS BY:

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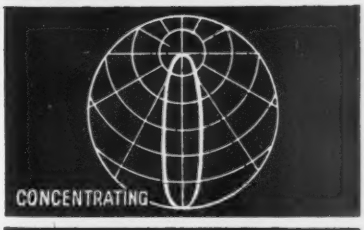
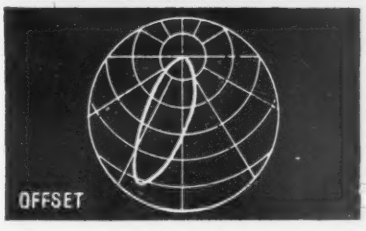
THESE DIESEL ENGINES ARE ALSO AVAILABLE FOR OTHER INDUSTRIAL APPLICATIONS, AGRICULTURAL POWER REQUIREMENTS, FOR GOODS AND PASSENGER VEHICLES, AND FOR MARINE CRAFT.

F. PERKINS LTD., PETERBOROUGH. PHONE: PETERBOROUGH 5341

ARCHITECTURAL SCHEMES

A New Lighting Approach





INTENSIVE · CONCENTRATING · OFFSET

A new lighting approach to Architectural schemes has been made possible by the development of a range of Holophane 'LENTILITE' (REGD.) Circular In-Bilt units which give Intensive, Concentrating and Offset light distributions.

The range includes Flush and Semi-recessed units for recessment into the ceiling, and Close-Ceiling units for use where recessment is not possible.

'Lentilite' units give the Architect wide scope for integral design while affording a high standard of light control combined with pleasing appearance. Full details and technical information available on request.

HOLOPHANE LIMITED

SCIENTIFIC ILLUMINATING ENGINEERS

ELVERTON STREET, WESTMINSTER, LONDON, S.W.1. Phone: VICtoria 8062. Grams: Holophane Sowest London

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WATER HEATER THERMOSTAT

at half the price!

For many years the name Sunvic has meant dependable thermostatic control of electric water heaters. Now a new model, type TQB, whilst maintaining the same standard, is at the same time more compact and costs half the price. It is an immersed, withdrawable type and its performance complies with BS. 1555.

The only available thermostat conforming to present trends, its introduction marks an important advance in thermostat design.

One more example of the continuous development of *CONTROL*

EQUIPMENT BY SUNVIC

SUNVIC CONTROLS LTD. (*Domestic Division*), No. 1 Factory, Eastern Industrial Estate, HARLOW, ESSEX. *Tel. : Harlow 24231/5*

Manufacturers of Simmerstat, Oven Thermostats, Radiant Hotplates and Pneumatic and Electrical Instruments for detection, measurement, control and recording of Temperature, Flow, Liquid Level, Specific Gravity and Pressure, in Science and Industry. Vacuum Pumping and Measuring Equipment, etc.

Member of the A.E.I. Group of Companies.

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copying

To claim that copying costs come down with AZOFLEX is a bold statement — but one that happens to be very true. AZOFLEX photo-printing machines and materials provide the ideal means of producing inexpensive, high-quality facsimiles of drawn, typed or printed originals of all kinds — single or double-sided, translucent or opaque. Many important industrial, commercial and professional organizations have already proved the economy and effectiveness of the AZOFLEX process.

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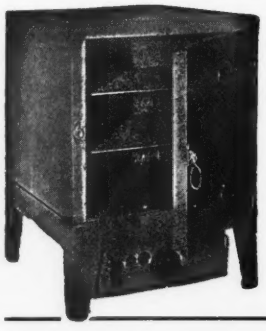

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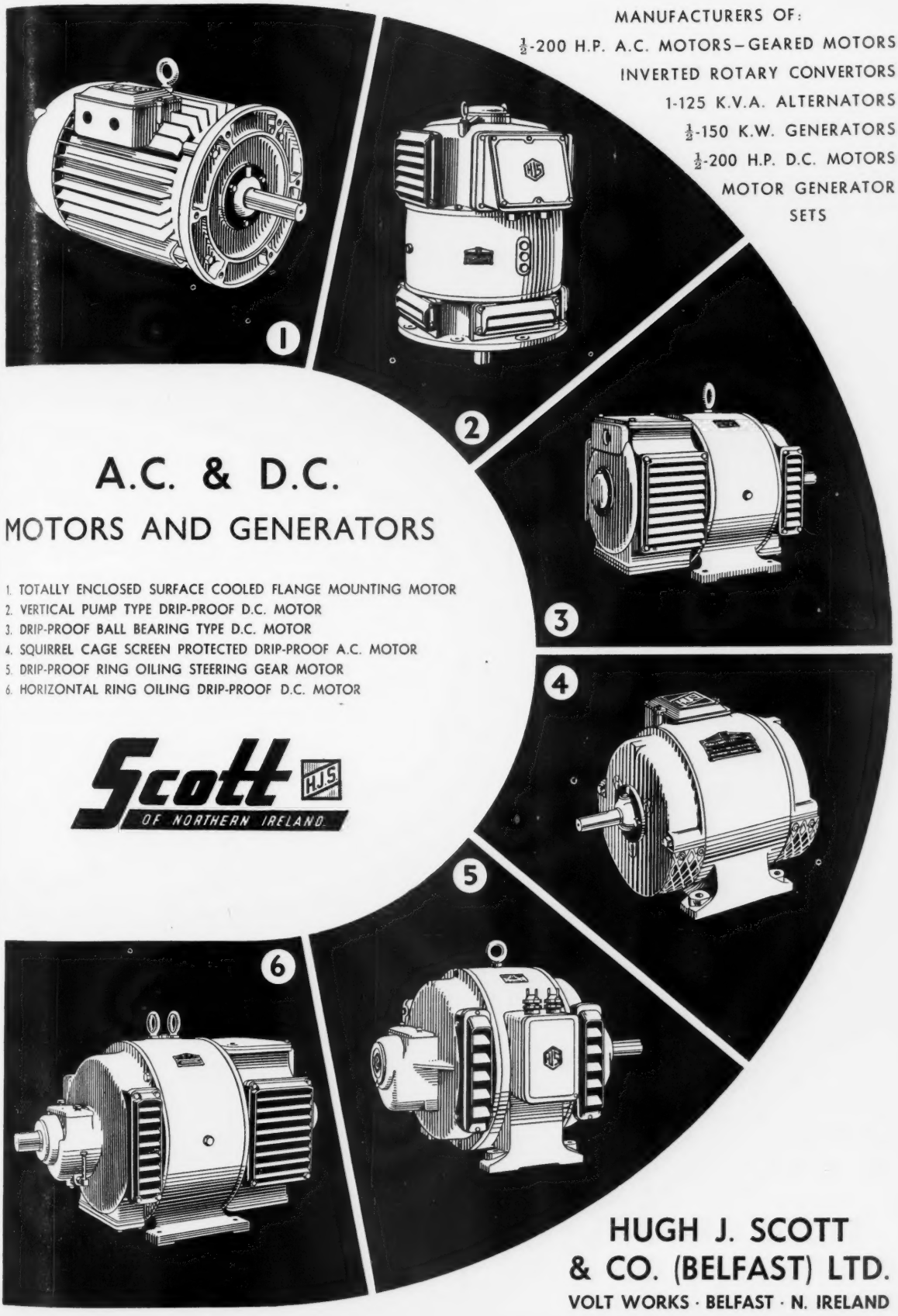

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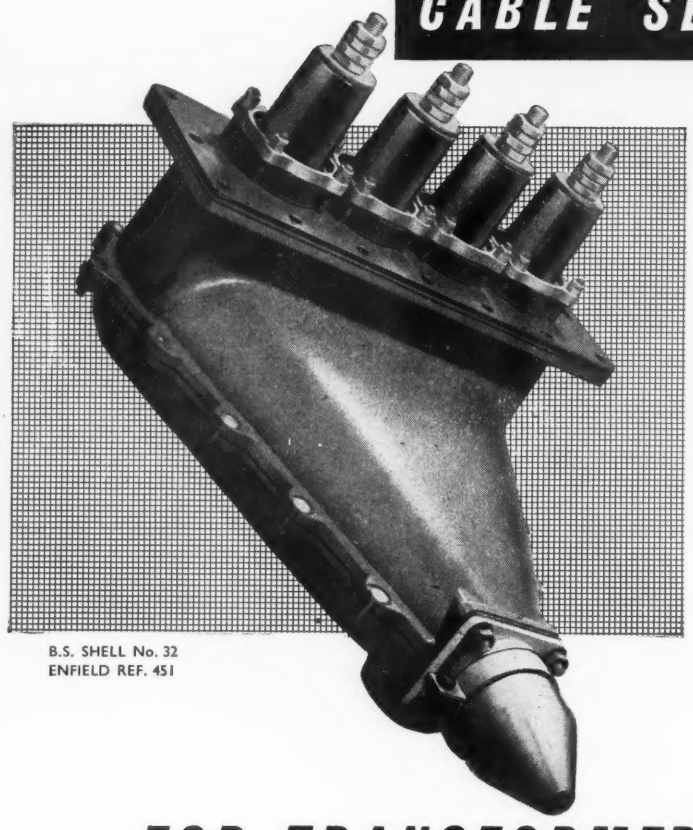

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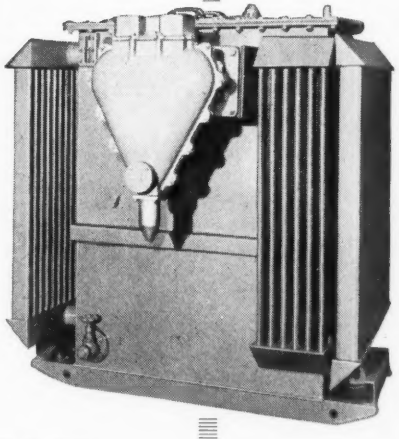

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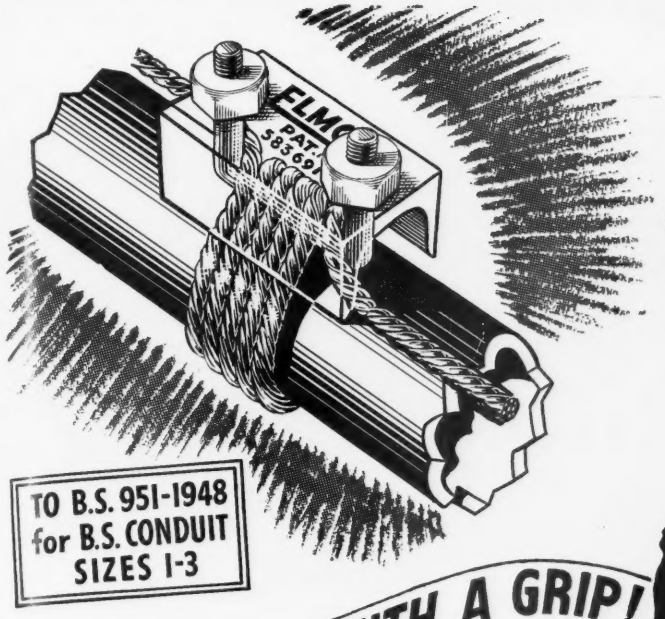

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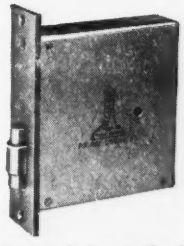

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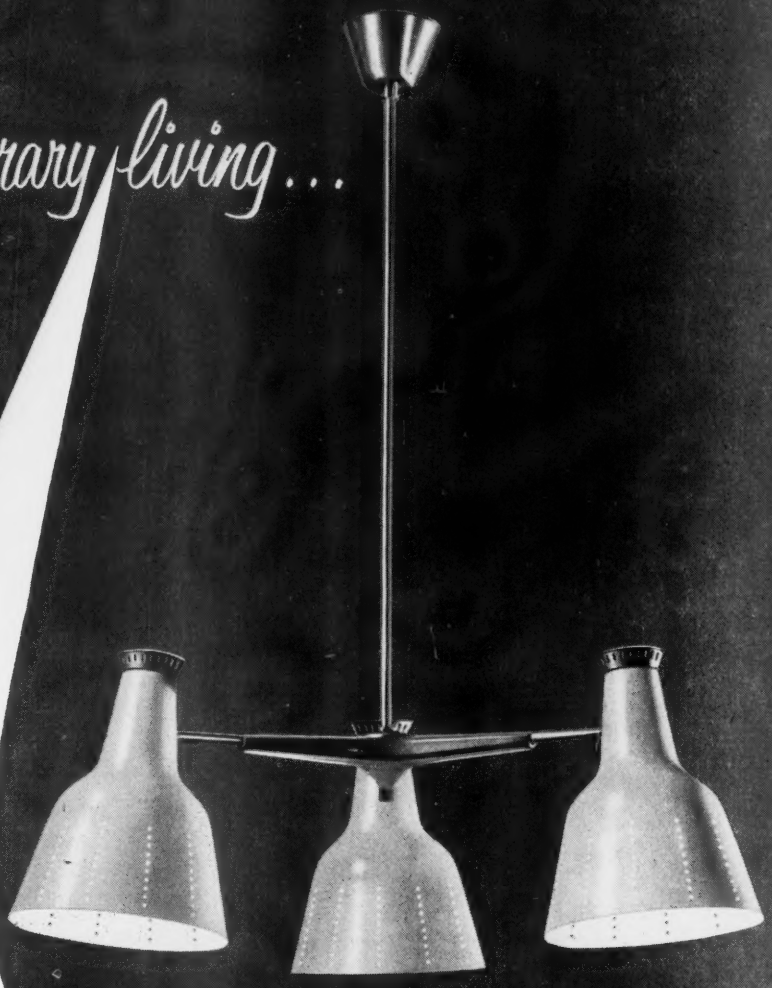

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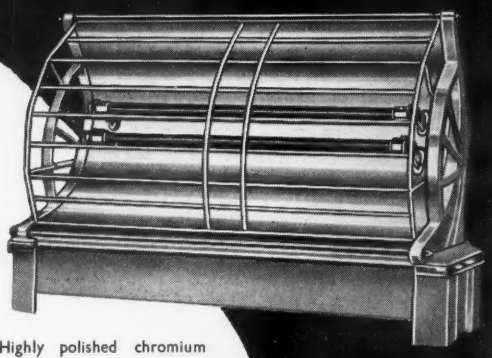

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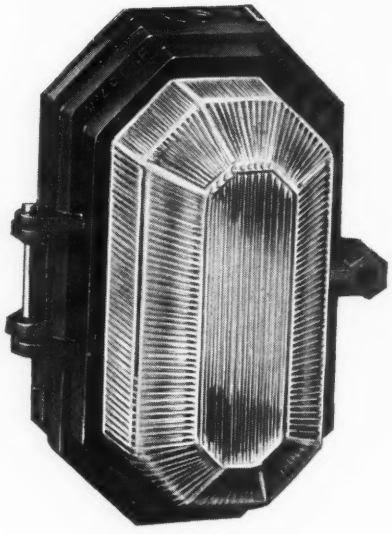

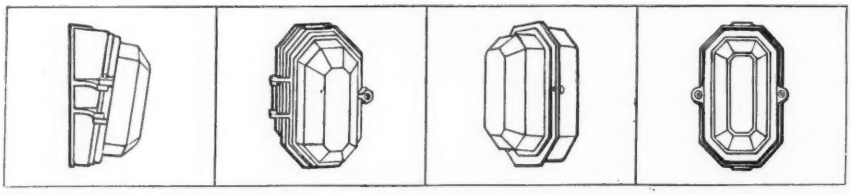

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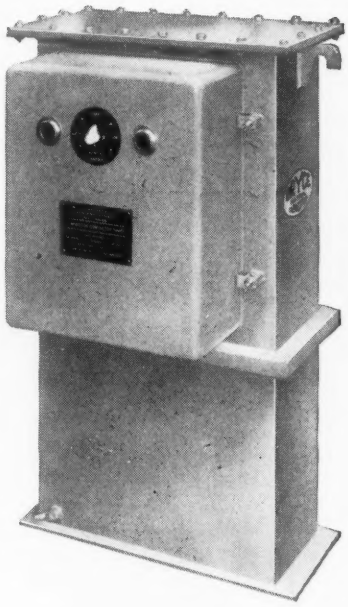

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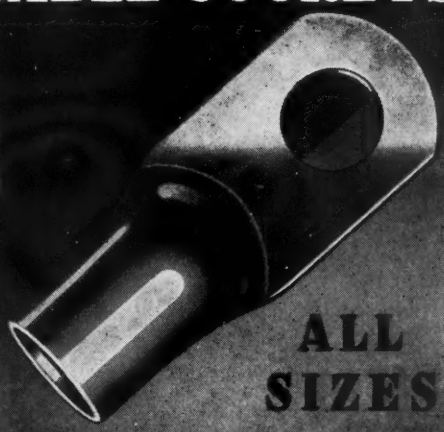

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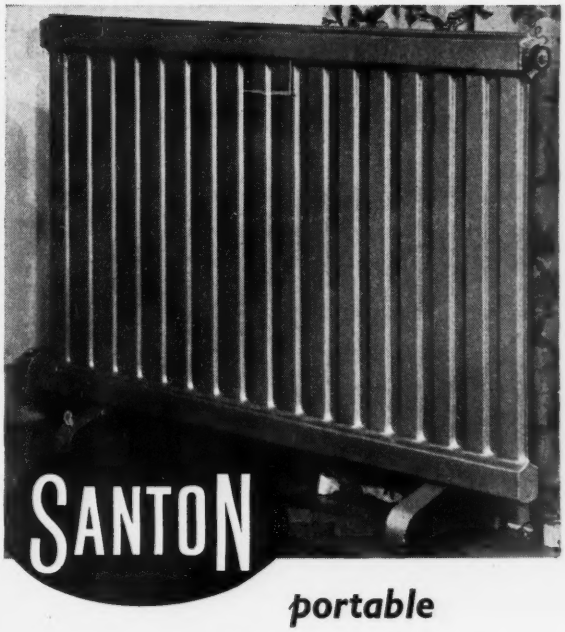

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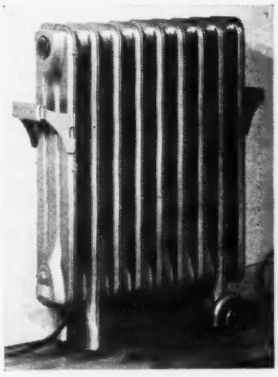

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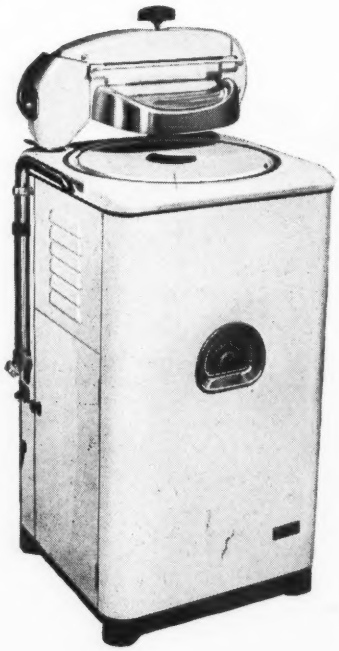
Your own specialized knowledge will approve the fine engineering that lies behind the Parnall's superb appearance.



3 EFFICIENCY
The unique Parnall agitator provides a scientific water-action that *really* gets clothes cleaner.

4 EASE OF OPERATION
Standard sink height obviates stooping. Power washing, wringing and emptying mean less exertion.

5 RELIABILITY
In addition to carrying the seal of the Good Housekeeping Institute the Parnall has our own twelve months' guarantee, most generously interpreted: plus nation-wide service organization.

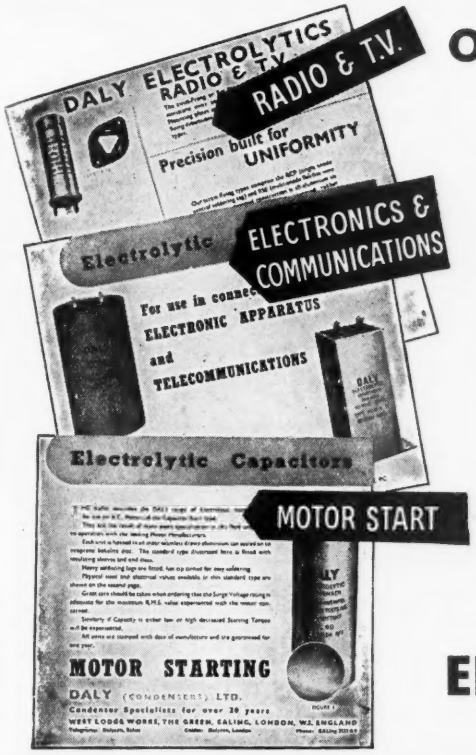
6 PRICES:
Such value for money at £65.2.0 (or £75.12.0 with own heating element)—no wonder Mrs. Brown is selling for you! Wherever there's a Parnall User, she's busy telling her friends to buy one.

P.S *And don't forget that the Parnall is supported by* consistent *nation-wide advertising, displays, showcards, leaflets and demonstrations at Exhibitions — with enquiries passed to YOU!*

PARNALL World's Best Safety Washer!

PARNALL (YATE) LIMITED • 255 NORTH CIRCULAR ROAD • NEASDEN • NW10

WHG/P30



One [or more] of these leaflets is for YOU...

These three leaflets fully describe the wide range of standard DALY electrolytic capacitors. In general, the types listed will cover most requirements. Where specifications outside this range must be met, however, DALY will design and make special units to meet specific needs.

Behind DALY capacitors there lies 20 years of making only electrolytics, highly specialised experience which engineers throughout the world are finding invaluable, and which is readily available to you.

We shall be happy to send you copies of these leaflets without obligation.

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Of distinguished appearance, with neutral coloured body, deep maroon heat-resisting handle and die-cast stand.

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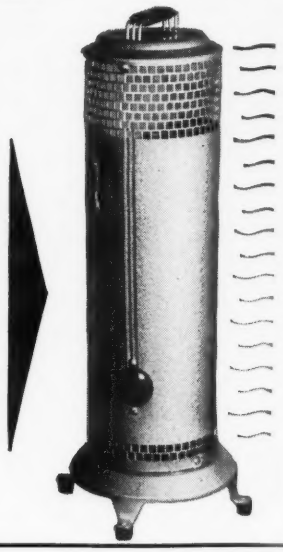

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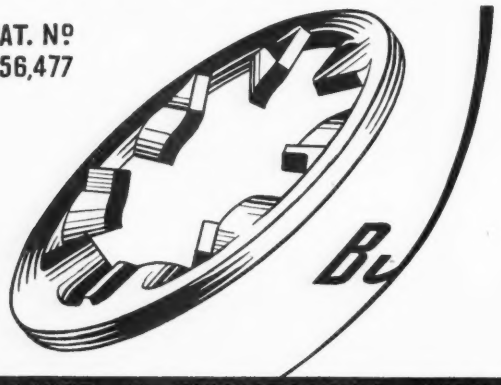

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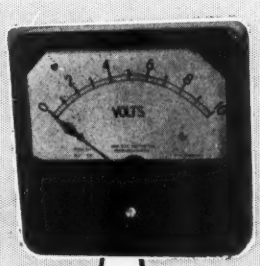

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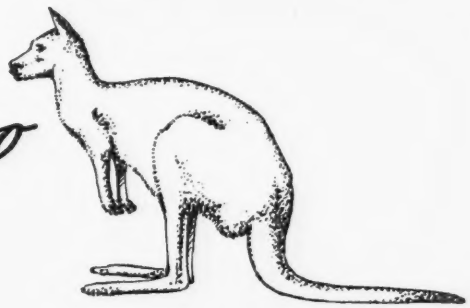

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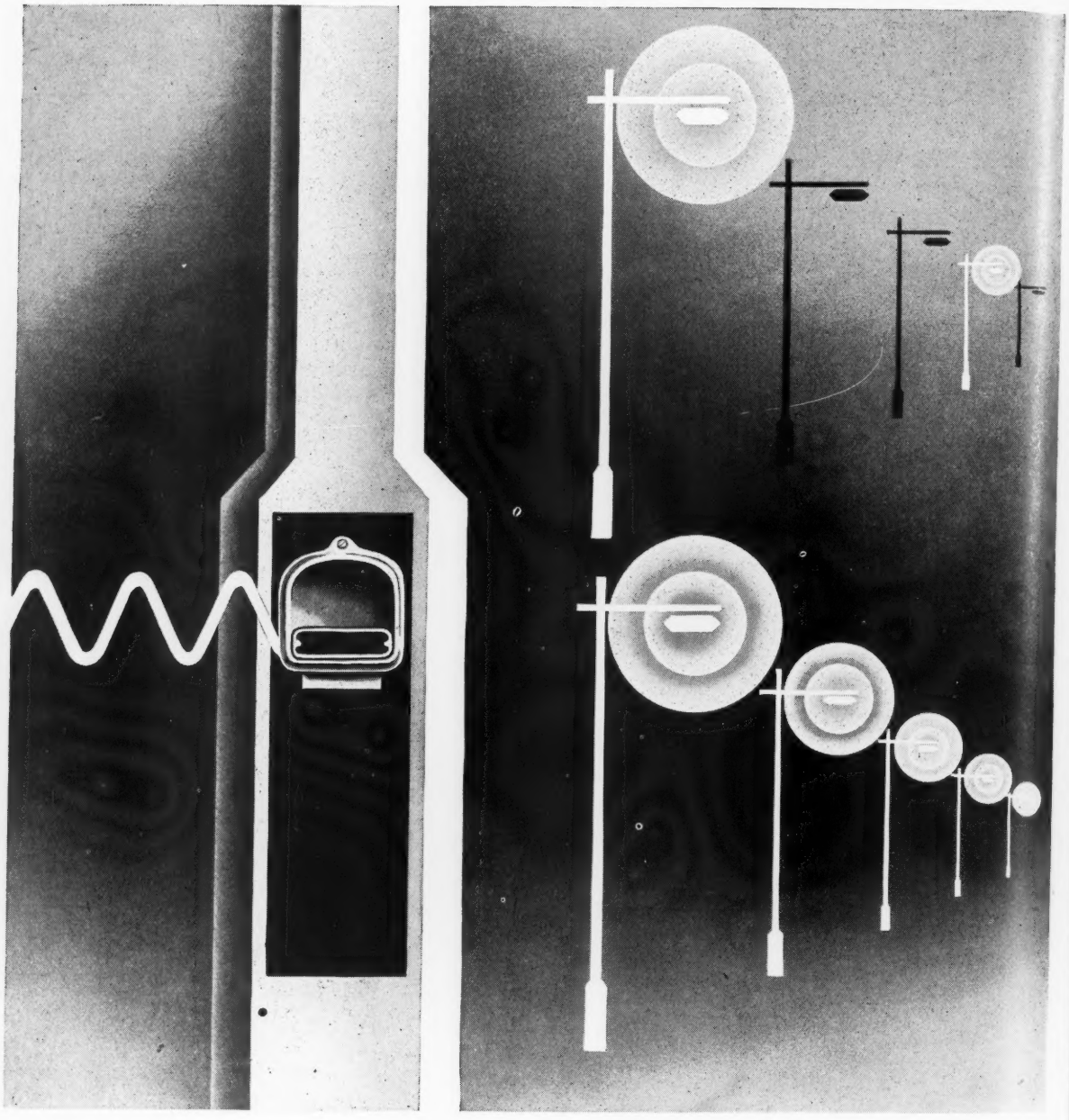

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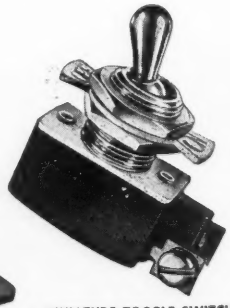
3 amp., 250 volt



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MAINS VOLTAGE SIGNAL LAMP—S.L.81.
Complete with built-in neon tube and resistance. Models for 80 to 500 volts.
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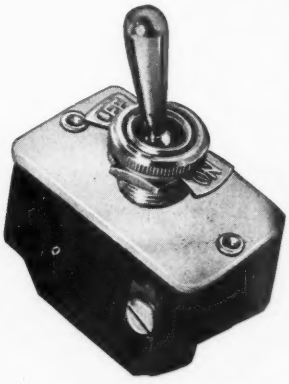

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This METROVICK moisture-proof fitting is specially made for use in laundries, textile mills, garages, paper-making plants and other places where water spray, steam or excessive humidity is encountered. The fitting is suitable for indoor or outdoor use. A two-lamp fitting is also available.

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Radio interference suppressor fitted. Fittings supplied complete with gear ready wired for connection to supply mains. Suitable for chain or conduit suspension.

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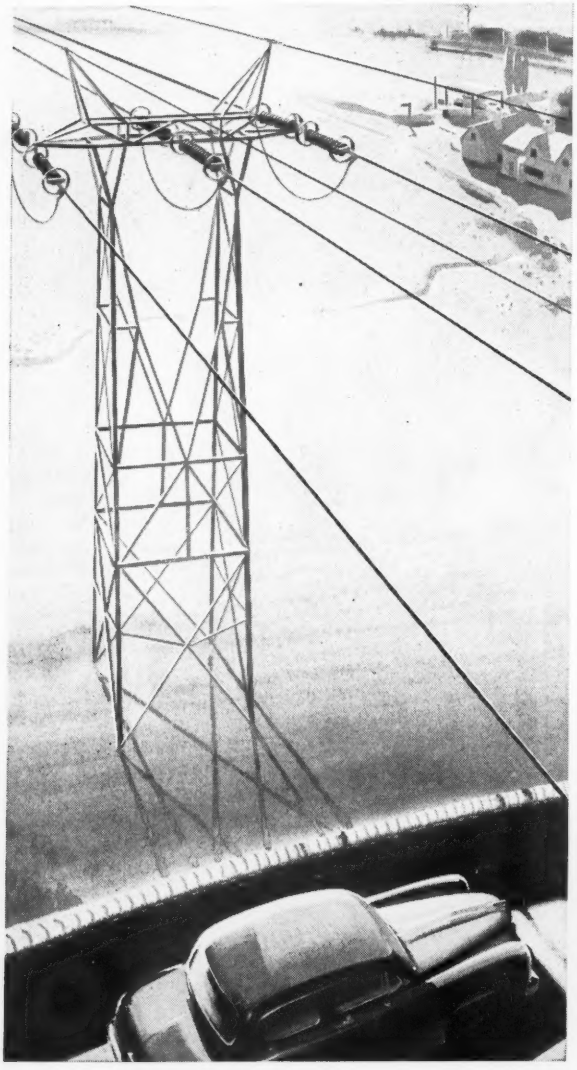

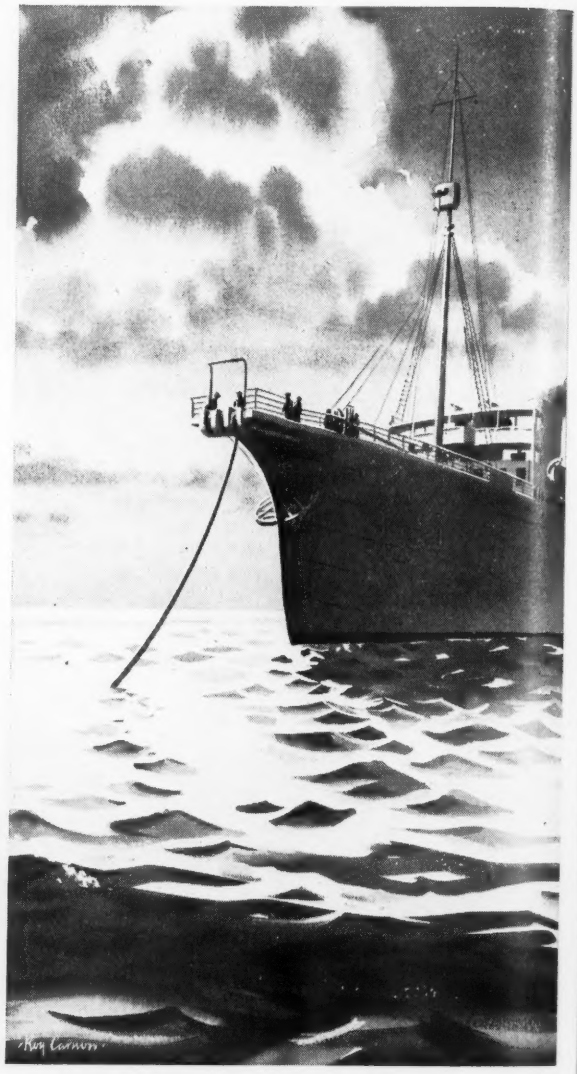

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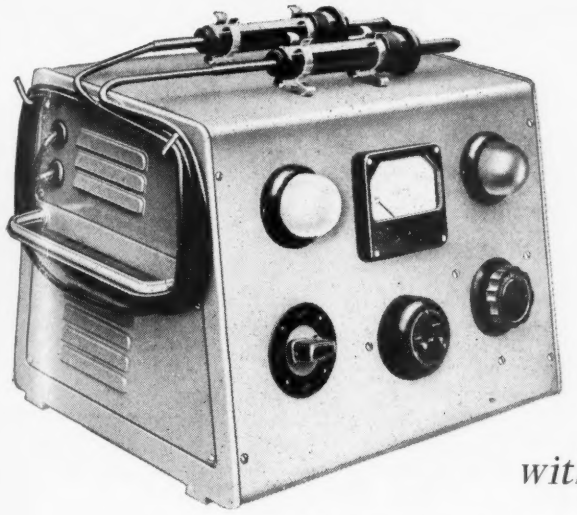

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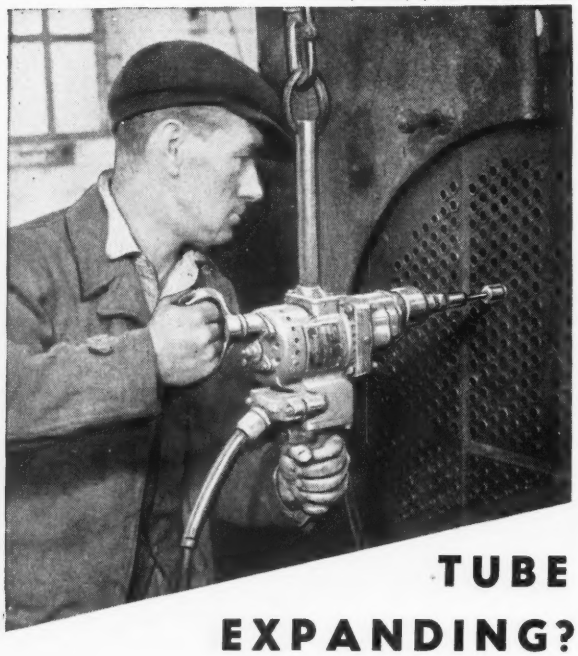

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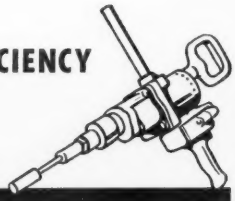

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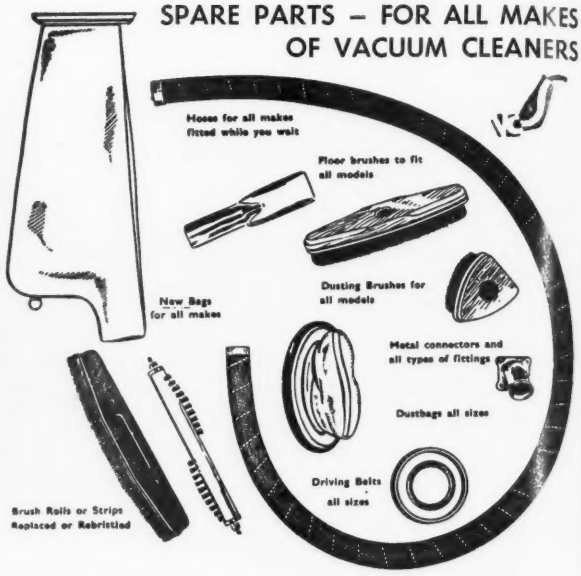
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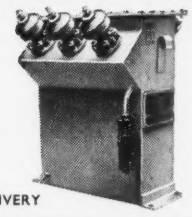

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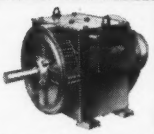
Compared with the orthodox alternator with overhung exciter

In	price	weight	volume	c.i.f. charges
the	BRUSH		Square	Path
Alternator	saves	you	about	20%

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1000 HP

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installed at

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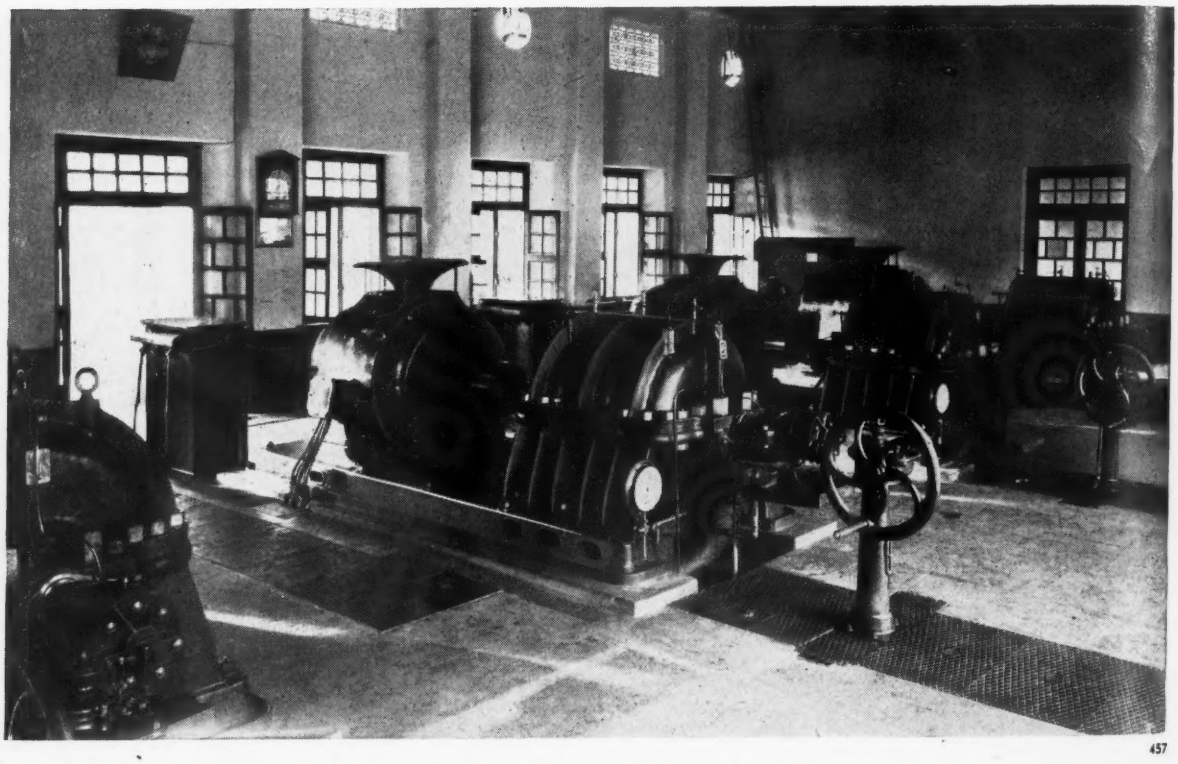

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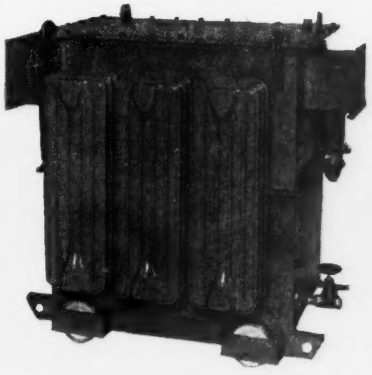

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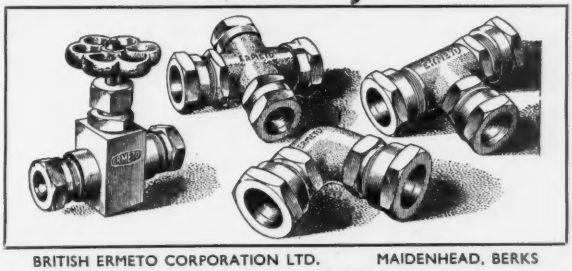

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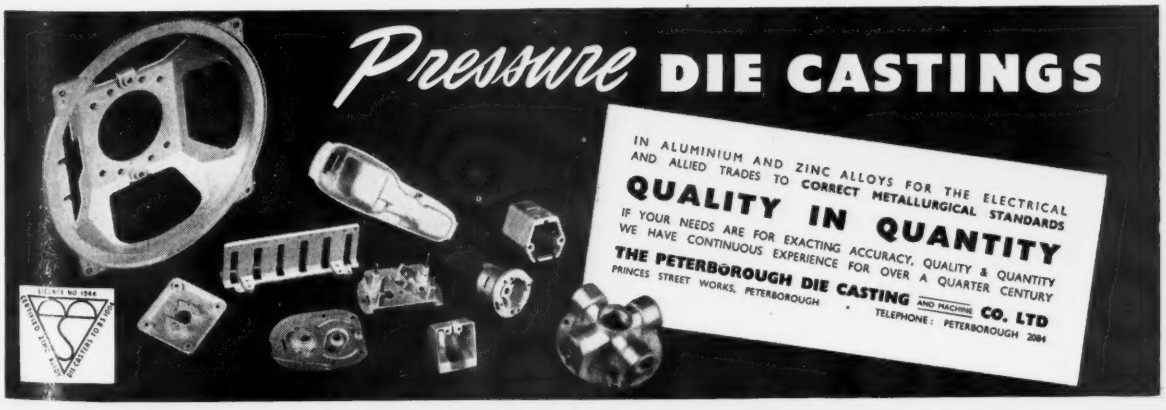
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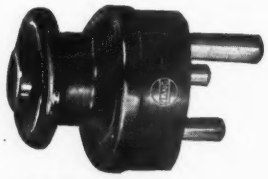

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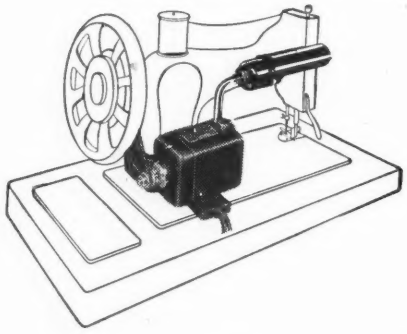

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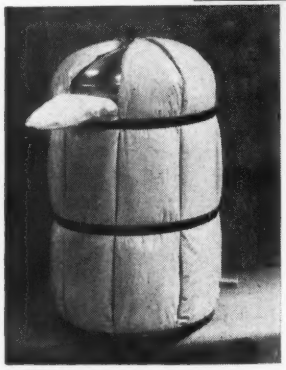

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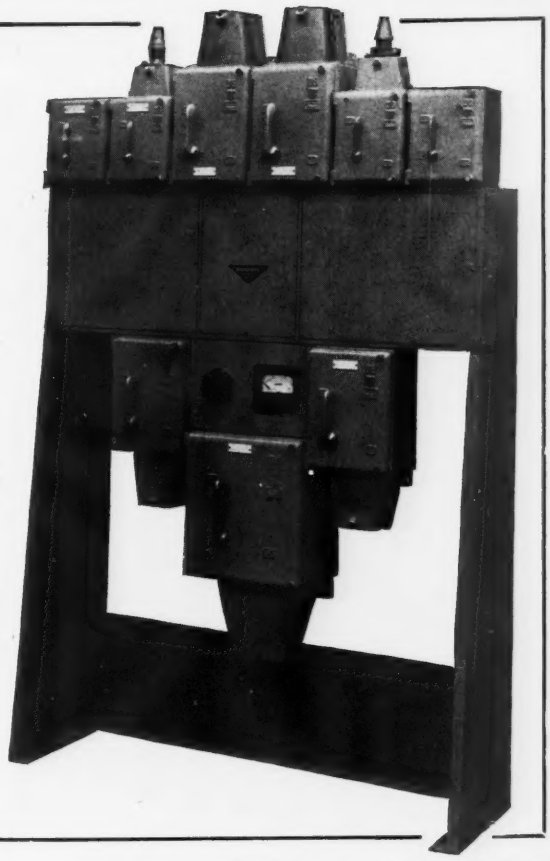

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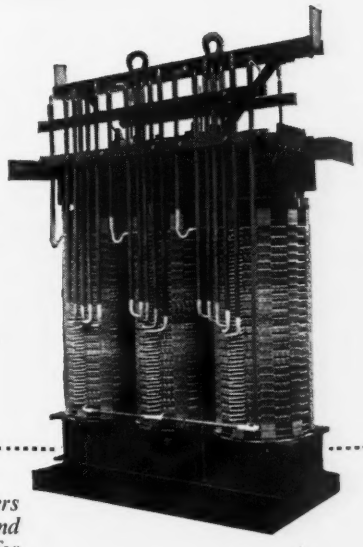

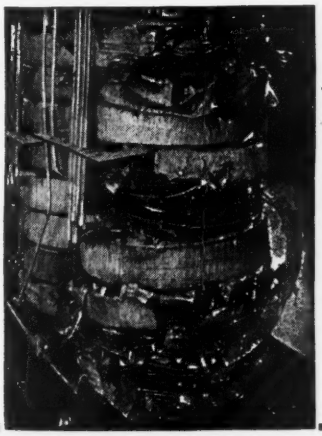

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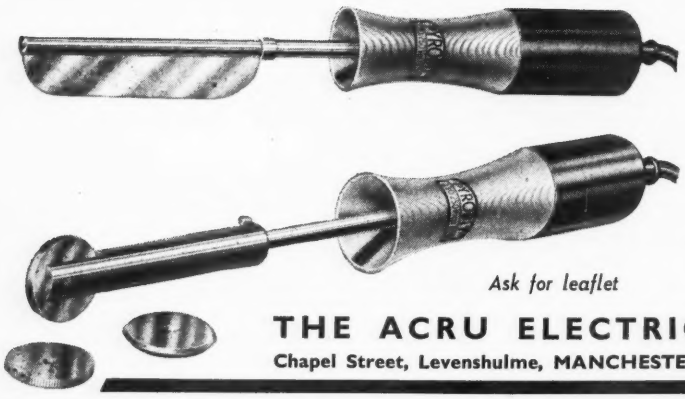

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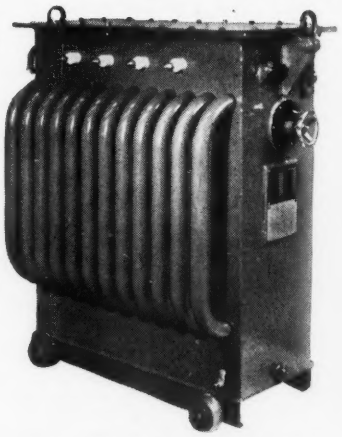

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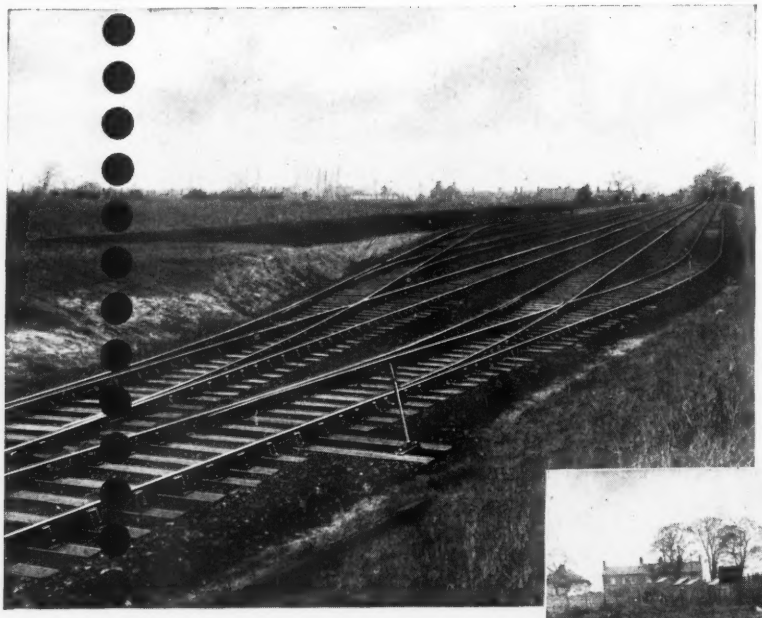

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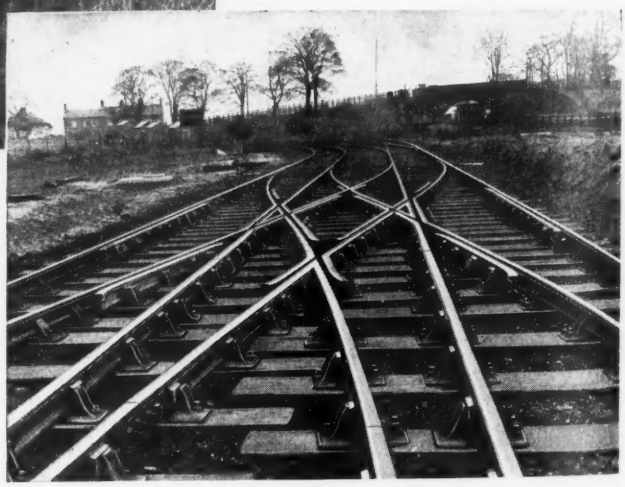

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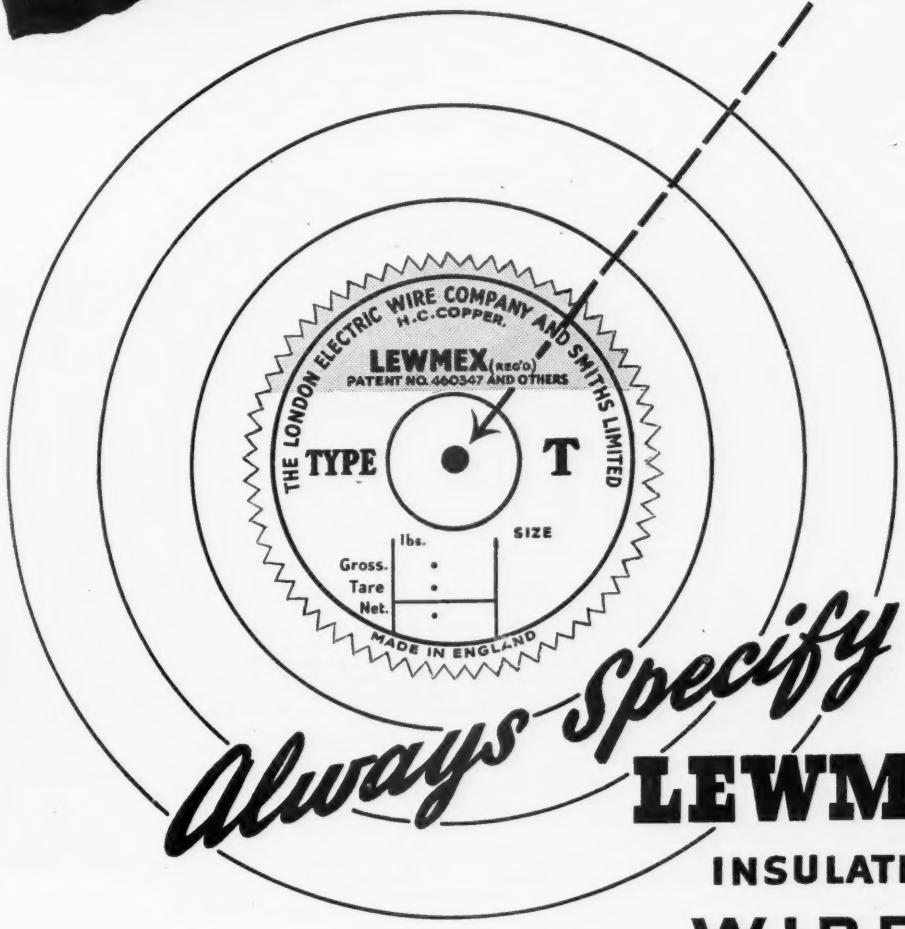

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26 NOVEMBER 1954

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VOLUME 155 ✧ NUMBER 22

Eighty-Third Year of Publication

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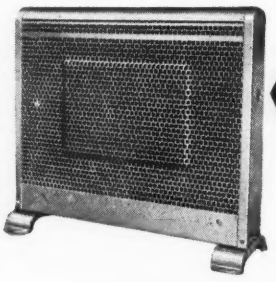

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ELECTRICAL REVIEW

26 November 1954 Vol. 155 No. 22 Established 1872

Thermionic Valve Jubilee

THE original patent specification for the "oscillation valve," a diode, was filed by Sir Ambrose Fleming on 16th November, 1904, but it was more like a thyratron than a diode in its characteristics, since in those days suitable apparatus was not available for producing really high vacua. It did mean, however, that the work of Edison some 20 years earlier had been advanced sufficiently to enable the high-frequency currents set up in a radio receiving aerial to be rectified. Thus the development of radio was put on a really sound footing and the door was opened to possibilities not dreamed of by the workers of those days. During the following year Lee de Forest in America filed a patent for an improved form of valve with three instead of two electrodes; this was the forerunner of the present-day triode.

Little further progress was then made until about the beginning of the first world war when radio communication facilities were needed for military purposes. Since that time valve development has proceeded at an ever increasing rate and to such an extent that it has made what is almost undoubtedly a greater impact on both social and industrial life than any other invention of this century in the field of light current electrical engineering.

On the social side radio and, more particularly, television have materially affected the pattern of many people's lives and in spite of controversial opinions on the subject it has generally contributed towards a better standard of living. Communication between ships, aircraft and the rest of the world has also been made possible by the development of the thermionic valve, as has radar, direction finding equipment and other allied radio aids to navigation. Without these travel would indeed be a difficult business. Long-distance telephony too would not be possible without valve amplifiers.

In industry where far more valves are employed than are used in "radio," in its broadest sense, there seems to be a thermionic valve operated device to answer almost every problem, the number of electronic control systems, measuring instruments and so forth, being so diverse and too numerous to mention. As Dr. J. Thomson said at the I.E.E. last week we can, during the next half century, confidently look forward to the employment of electronic control in all departments of human activity. Having already used machines to reduce manual labour we may now expect electronic devices to be developed to do our thinking for us, but however far we get along this road we can never produce anything so good as the human brain.

It is, however, certain that during the next fifty years we shall see even more striking developments than have gone before. Some engineers may be wondering if the valve itself might not be superseded by, say, one of the semi-conductor devices which are at present undergoing vigorous development. Taking a broad view it looks as though thermionic and crystal valves will generally be complementary and not competitive.

SALES BOOM

The last two reports of the British Electricity Authority showed that the increases in sales of electricity to domestic consumers were not so great as in some previous years. This was the outcome of the compulsory suspension of active selling by the Electricity Boards and restrictions on hire-purchase. With the removal of these handicaps there is now every indication that this year's sales of electricity will show a substantial advance; from all quarters there are reports of a boom in domestic appliance business. Quite extraordinary interest is being shown in our regularly-published schedules of appliances which provide comprehensive surveys of each class of equipment available. In the Board of Trade's monthly review of retail business for September it was stated that in the household goods section the increase in the sale of electrical and radio goods was outstanding; the department stores reported an increase in sales of over a third as compared with September last year and independent retailers a quarter. Electricity Boards, not included in the review but doing a substantial part of this business, are also reporting phenomenal rises in sales.

THE TEMPERATURE GAP

On being shown recently some modern developments in electric heating elements we inquired about the advance they represented in the efforts to obtain elements which afforded higher temperatures. The rather guarded reply was to the effect that the elements in question would run at about 1,400 deg C. We well remember similar replies twenty or so years ago, and this implies that really little advance has been made in this particular direction over a fairly long period. This is not intended as an adverse criticism of anyone, because we are well aware of the intense efforts that have been and are still being made to fill the gap between the 1,400 deg C afforded by the electric element used largely for heat treatment and the, say, 3,500 deg C of the arc in an electrode furnace for melting. It is well openly to recognize that this wide gap represents a serious defect in industrial electric heating, and we urge that the efforts to rectify it should be continued and where possible intensified.

LAG IN PLANT PROGRAMME

With only two months to go before the end of the year, the Ministry of Fuel and Power's figures for October show that less than half of the 1,500 MW of additional generating plant authorized has yet been installed. At the end of last year the capacity was 19,169 MW and the latest total of 19,832 MW thus represents a gain of 663 MW. Allowing for the normal end-of-the-year spurt, it therefore appears unlikely that even last year's lower figure of 1,413 MW will now be achieved. Shortages of steel in 1951 and 1952, as Lord Citrine pointed out in a recent review of the position, have mainly been responsible for this failure to reach the hoped-for rate of installation. This was, of course, foreseen and as a short-term measure to help, in a small way, to relieve the plant shortage the British Electricity Authority, in its 1952–53 report, announced that it had decided to order 50 MW of diesel-engine generators for installation before the end of 1954. It was, however, only last month that the first two of these sets totalling 3·28 MW, were commissioned.

THE FIRST DYNAMO?

The outstanding nature of Faraday's discovery in 1831 of electro-magnetic induction as a means of producing electric currents tends to throw into the shade the many contributions of the first importance that were made to technology by other investigators in the first half of the nineteenth century. Many of these were announced almost simultaneously in different countries, so that credit for priority is difficult to establish. In his chairman's address to the Irish Branch of the Institution of Electrical Engineers (reported in this issue), Mr. R. A. Cuffe draws attention to the remarkable pioneering work of some of his compatriots. The most notable of these is the claim that the first dynamo was made in July, 1832, by an anonymous Dublin correspondent of Faraday's. With its aid the identity of chemically and magnetically produced electricity (previously a moot point) was established and Faraday was so impressed by it that he secured its immediate publication in the *Philosophical Magazine*.

ENGINEERS' DISAPPOINTMENT

Salary increases approved by the National Joint Board for the Electricity Supply Industry (the first since 1952) will have a poor reception from members of the Electrical Power Engineers' Association, judging by the comments on the new schedule made by the *Electrical Power Engineer*. It is said that the settlement of a long-standing dispute, which culminated earlier this year in what was virtually a strike threat, is accepted only as an instalment on account, suggesting that there will be a further demand. While we would not go so far as to say that the suggestion of " drastic action " was not serious, it is in line with the responsible nature of the Association that such action should be regarded only as the last desperate resort. The employers' side of the N.J.B. considers that the new schedules, which not only institute increases but have been amended in the employees' favour, should be generally acceptable but it is evident that this is not the unanimous view of the technical staff.

WASHING MACHINES

Next week in our series of illustrated surveys of domestic electrical apparatus we shall be dealing with electric washing machines. Particulars given in tabular form will cover dimensions, tub capacity, method of operation, loading of heated models, special features (pump, wringer, etc.), finish, price and purchase tax. In view of the anticipated heavy demand, orders for additional copies of the *Electrical Review* should be placed without delay. Wash boilers will be the subject of our next survey (24th December)

BOILER FIRING METHODS

Their Influence on Power Station Thermal Efficiency

By E. J. PAYTON, A.M.Inst.F. (South Eastern Division, British Electricity Authority)

THE maximum operating efficiency which can be attained by a power station with a given pressure and temperature cycle depends primarily upon the efficiency limitations of its boiler and turbine units and the efficiency of the boilers is affected to a marked degree by the method of firing installed.

It is impossible to compare the actual performance of power stations to assess the effect of different types of boiler firing owing to other local influences too complicated to resolve, but a survey has been made to compare the mean efficiency on test of boilers fired by pulverized fuel, travelling grate and spreader stoker. The results have been analysed to give reasons for the wide differences in performance. The calculated effect on the efficiency of a hypothetical power station is also shown.

Figs. 1 to 5 show typical examples of the types of boilers covered by the survey. The three most usual arrangements for pulverized fuel firing are given in Fig. 1, which illustrates a typical tangentially fired boiler where the burners, either fixed or arranged for tilting, are placed at each corner of the furnace, Fig. 2 which shows an example of horizontal intertube burner firing where a number of burners are introduced between the tubes of the front wall, and Fig. 3 which shows the vertically downward long flame arrangement of firing where the burners are near the top of the furnace. Fig. 4 illustrates the well-known travelling grate stoker firing practice and Fig. 5 gives an example of the comparatively new spreader stoker method where coal is fed by throwers on to a forward moving grate, allowing a proportion of the fuel to be burnt in suspension.

The figures given in the survey have been obtained from the agreed results of the official tests carried out

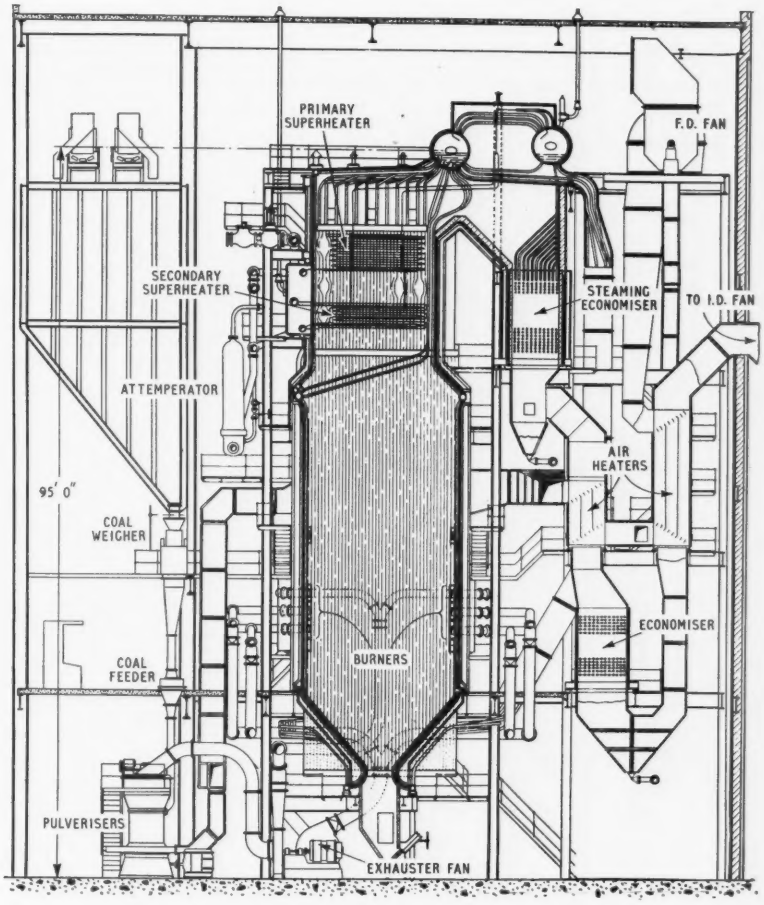


Fig. 1.—Pulverized fuel fired boiler with corner burners

Table I.—Test Efficiencies

Method of Boiler Firing	1 Average Capacity: klb/hr	2 Number of Tests		3 Gross Efficiency	4	5 Net Efficiency	6 7 Effect on Power Station Thermal Efficiency	
		A	B	Net C.V.	Gross C.V.	Gross C.V.	600 psi/ 800 deg F	900 psi/ 900 deg F
Pulverized fuel	325	18	7	92·1	87·4	84·8	26·5	29·0
Travelling grate stoker	215	15	6	89·5	84·3	82·7	25·8	28·3
Spreader stoker†	240	2	1	90·0	84·6	82·5	25·7	28·1
Latest design p.f.	350/860	—	—	93·5	88·8	86·3	27·0	29·5

† One installation only.

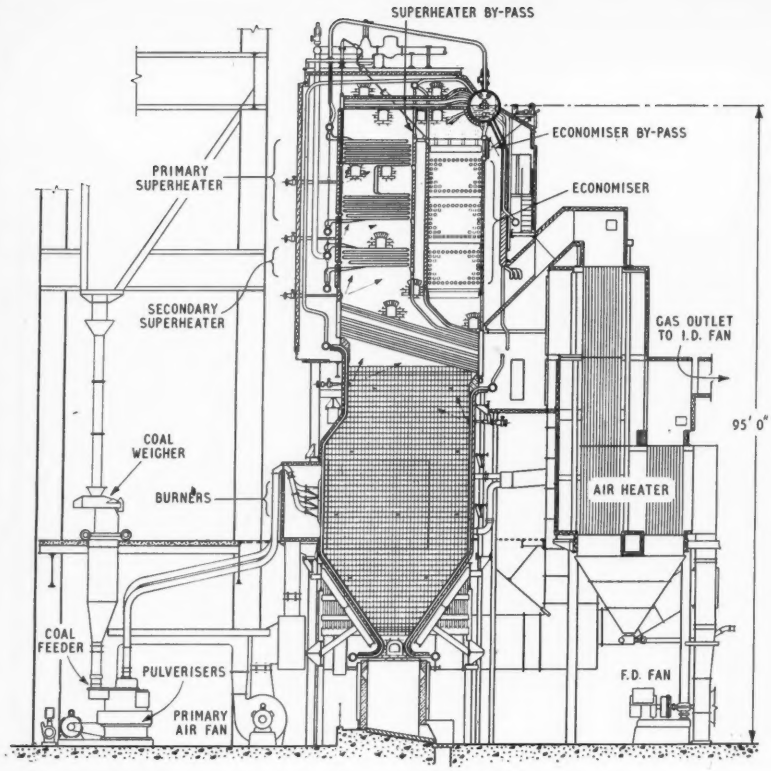
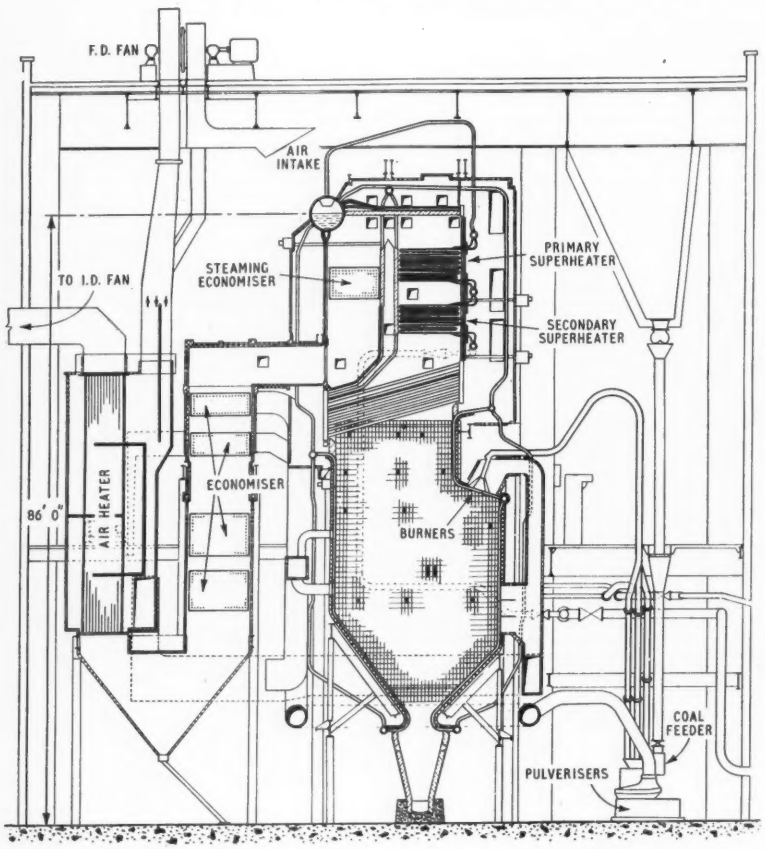


Fig. 2.—Pulverized fuel fired boiler with front horizontal burners

Fig. 3.—Pulverized fuel fired boiler with vertical, long flame burners



on boilers in power stations of the B.E.A. in the period January, 1950, to December, 1953. Performance is thus compared on the basis of efficiency under test conditions but it is considered that the method also gives a reliable indication of the comparative performances attained in everyday operation.

Statistically it would be a simple process to group the results of boiler trials into their respective classes according to the method of firing and to draw straight comparisons. This would be misleading, however, as many factors have to be taken into account before useful comparisons can be made. For example, the test efficiency of a boiler is influenced by both the type or range of types of coal for which it was designed, and the type of coal on which it was tested. Again, boilers may be designed for widely different final gas temperatures which affect the stack loss.

Types of Equipment Studied

The selection of boilers included for study, therefore, was confined to those known to have reasonably unrestricted designs capable of allowing good combustion efficiency when burning normal high volatile coals which form the bulk of supplies to generating stations. The minimum capacity was limited to 240 k lb per hour for pulverized fuel and 180 klb/hr for travelling grates as representative of modern practice. The average capacities are given in Table 1. The capacity of the single spreader stoker installation is 240 klb per hour. Test results for all three arrangements of p.f. firing have been averaged to arrive at the efficiency figures quoted for p.f. boilers.

Results were available for two units of the only large spreader stoker installation tested and the mean performance figures have been included for interest. It should be borne in mind that this method of firing is comparatively new in this country, so that improvements in performance may be possible after further experience and experimental work.

The accuracy of testing has undoubtedly improved during the last few years, but some individual heat accounts showed discrepancies in the radiation and unaccounted losses. The combined figure for these losses, being conventionally arrived at by difference, is virtually the means of balancing the heat account. Abnormally high or low figures therefore indicate test measurement errors. Results were consequently discarded where the radiation and unaccounted loss figures showed that tests were unreliable. Even so, it was found that the variability of this loss still gave a random error exceeding one per cent loss in approximately 25 per cent of the tests in each class. It was significant, however, that the heat accounts for p.f. and travelling grates, drawn up from the mean values of all losses, balanced within 0·1 per cent efficiency. It is concluded that the systematic error is of negligible proportions for comparative purposes. The

basis of calculating losses was not uniform in all cases and corrections to some test figures were necessary.

The number of tests contributing to the average figures for each type of plant is shown in Table 1, column 2, from which it will be noted that, in addition to "A" tests, a similar proportion of "B" tests have been included in each case. ("A" tests are the official acceptance tests for the plant and "B" tests, termed "deferred efficiency tests," are carried out six months after the "A" tests on the same units to demonstrate the capabilities of the boilers in maintaining their efficiency and availability during a protracted run and without recourse to off-load cleaning.) By including "B" tests it is considered that more realistic figures for comparison of performance are obtained by the introduction of a factor for the ability of a boiler to maintain its "A" test efficiency. The average drop in efficiency between the "A" and "B" tests for p.f. and chain grate stokers is given in Table 3. Figures for spreader stoker tests have been omitted from this comparison, experimental work being still in progress at the time of the tests.

To compare the various aspects of boiler efficiency, figures are given in Table 1 for the gross boiler efficiency calculated on both the net and gross calorific values of the coal. The net boiler efficiency calculated on the gross c.v., which after all is the "effective" efficiency, is also given. Table 2 gives the principal losses recorded on test from which it is possible to account readily for the different efficiencies shown in Table 1. Other particulars of performance and coal quality are given in Table 2, which will allow more detailed comparisons to be made.

Comparison of Test Results

Referring to Table 1, the average efficiencies returned from tests on boiler plant fired by the three different methods are given. The calculation of gross efficiency on net c.v. excludes both power consumption used by boiler auxiliaries and the uncontrollable losses due to moisture and hydrogen in the fuel. It is therefore a measure of the purely combustion efficiency attained. P.f. will be seen to have a lead of 2·6 per cent over travelling grates and 2·1 per cent over spreader stoker firing.

The loss due to moisture and hydrogen in the fuel is reflected in the figures for gross efficiency on gross c.v. of coal. Mainly because a drier coal is used by p.f. boilers, the efficiency difference on this basis is greater, p.f. being better than travelling grate and spreader stoker firing by 3·1 per cent and 2·8 per cent, respectively. The "spread" of the efficiency test results is shown by histograms in Fig. 6. Here p.f. boilers are shown to be more closely grouped about the mean point than travelling grate stoker boilers, indicating more consistent performance, even considering the widely different firing arrangements. It will also be noted that there is very little overlap

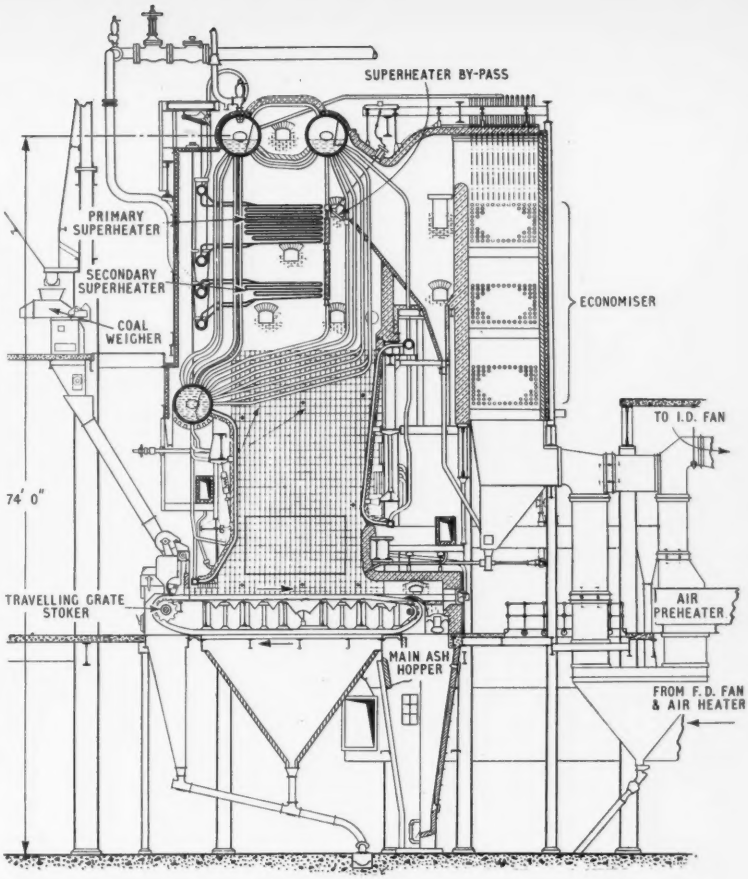
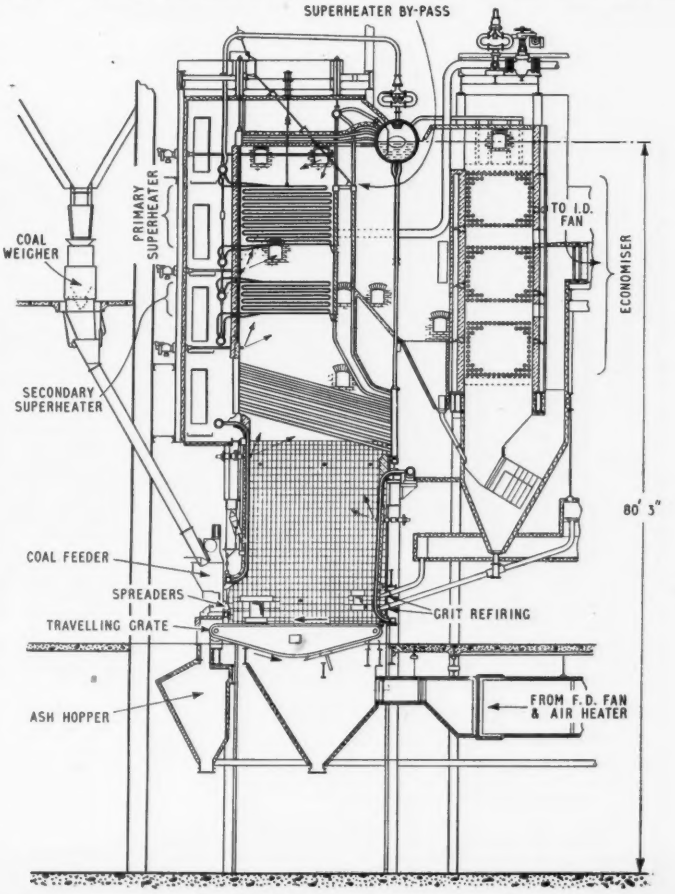


Fig. 4.—Travelling grate stoker fired boiler. Below: Fig. 5.—Spreader stoker fired boiler



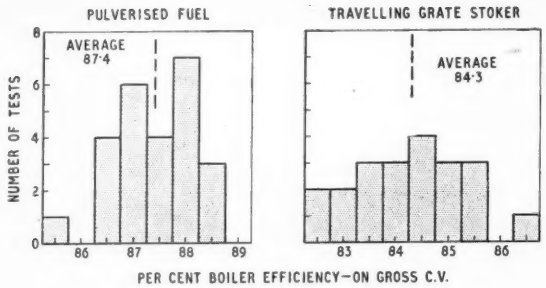


Fig. 6.—The efficiency test results are more closely grouped about the mean point in the case of p.f. boilers than with travelling grate boilers

between the highest figures attained for chain grates and the lowest for p.f. firing.

The net efficiency on gross c.v. is the effective efficiency so far as station performance is concerned and is the gross boiler efficiency on gross c.v. from which a deduction has been made for power consumption by boiler auxiliaries. P.f. will now be seen to lead by 2·1 per cent over travelling grates and 2·3 per cent over the one spreader stoker installation. The bottom line in Table 1 gives predicted performance figures for the latest design of p.f. boilers at present being built. A typical example of such a boiler is shown in Fig. 7 and its expected performance is discussed later.

Comparison of Losses

Table 2 lists the mean of the losses on test and certain performance figures for each method of firing from which comparisons can be made. Chain grates and p.f. show similar dry gas losses, but the components are different, the higher CO_2 obtained by p.f. boilers being offset by a higher gas temperature. It may seem strange that the final gas temperature of p.f. boilers is higher than that of boilers fired by travelling grates, particularly as p.f. firing results in less fouling and corrosion of air heaters on account of which lower temperatures could be tolerated. This anomaly appears to be partly due to p.f. boilers exceeding in practice their designed gas temperatures. The reason is not entirely clear, but in some cases furnace slagging is known to contribute to excessive temperatures and it is also believed that in certain circumstances delayed burning of carbon particles occurs which would release heat at a later stage than intended by the designer. Another factor may be the higher intake air temperature for p.f. boilers (column 13) which is due to the more common practice on p.f. boilers of providing intake ducts to extract hot air from the top of the boiler house. The dry gas loss for spreader firing is higher than for either p.f. or travelling grates because of a higher excess air rate, as shown by the lower CO_2.

With regard to moisture and hydrogen loss the advantage is with p.f. The average hydrogen content of coals used for p.f. is similar to that of coals used for stoker firing and the difference of 0·6 per cent in the moisture and hydrogen loss is all accounted for by the use of drier coal, as shown in column 17. Travelling grate stokers use a greater quantity of washed coal which has a higher free moisture content and dry slacks are also generally wetted before use to improve fuel bed conditions.

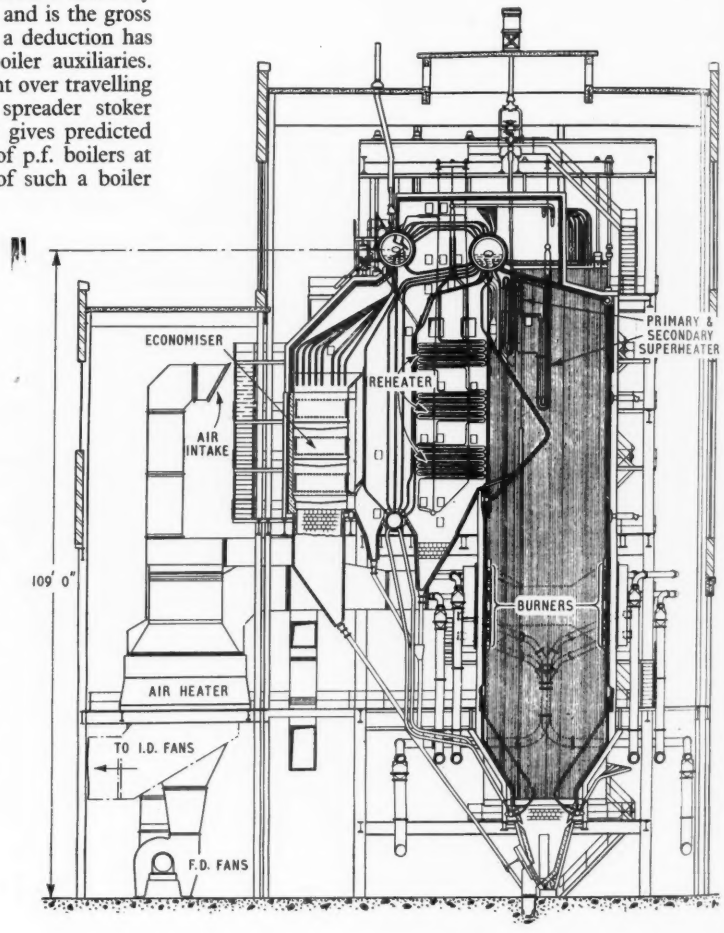


Fig. 7.—Latest type of pulverized fuel fired radiant boiler with re-heater

Table 2.—Test Conditions

Method of firing	8 Losses—per cent Boiler Efficiency: Dry Gas	9 Losses—per cent Boiler Efficiency: Moisture and H_2	10 Losses—per cent Boiler Efficiency: Ash and grit	11 Losses—per cent Boiler Efficiency: Rad. and unacc.	12 Losses—per cent Boiler Efficiency: Aux.* power	13 Test Conditions: Inlet air °tem. deg F	14 Test Conditions: Final gas tem. deg F	15 Test Conditions: Final CO_2 per cent	16 Test Conditions: Carbon in ash per cent	17 Coal Quality: Total moist. per cent	18 Coal Quality: Ash per cent	19 Coal Quality: Gross C.V. BTU/lb
P.F.	5·5	4·7	0·8	1·5	2·6	101	306	13·4	4·7	9·3	14.8	10.915
C.G.S.	5·4	5·3	2·8	2·2	1·6	86	291	12·5	15·0	15·3	11·3	10.618
S.S.	6·3	5·4	2·0	1·4	2·1	100	302	11·5	9·0	12·5	14·2	10.207
Latest P.F.	4·4	4·7	0·6	1·5	2·5	100	290	14·5	3·0	10·0	15·0	10.500

* Calculated on a heat equivalent of 13,000 B.Th.U./kWh.

The superior combustion efficiency of p.f. firing resulting from more intimate mixing of fuel and air possible when burning coal in powdered form, is shown clearly by the ash and grit loss. In spite of a higher mean ash content of coal and the lower excess air rate, the loss is 2 per cent less than for chain grates and 1·2 per cent less than for the spreader stoker. The percentage carbon in ash and grit shown in Table 2, col. 16, indicates the degree of completeness of combustion, but the histograms in Fig. 8 plainly show the marked consistency of p.f. firing compared with travelling grates. The wider " spread " of the results in the case of the latter is no doubt due to the much greater influence of coal characteristics on the efficiency of the travelling grate stoker firing method. The ash loss figures for the spreader stokers were closely grouped about the mean of 2 per cent.

Travelling grate stoker fired boilers record higher mean radiation and unaccounted losses, a contributory reason being the greater percentage radiation loss due to the smaller units. Another reason is no doubt the lower intake air temperature which has the effect of increasing the radiation loss compared with p.f. boilers where a greater proportion of radiated heat is reclaimed. It is also more likely for small quantities of combustible gas to escape with travelling grate firing than with p.f. or spreader stokers. Small quantities of gas accounting for up to 0·5 per cent boiler efficiency loss could in this way escape detection unless very sensitive sampling apparatus was employed.

Travelling grate stoker firing has the advantage of a lower auxiliary power consumption; p.f. boilers will be seen to consume an additional 1 per cent which is attributable to the milling equipment. Spreader stoker boilers might be considered to have similar auxiliary power requirements to those of chain grate boilers, but in the example given the figure is 0·5 per cent higher which must be partly due to increased fan power to provide the greater excess air quantity used, shown by the one per cent lower CO_2.

Table 3 shows the average loss of boiler efficiency (gross efficiency on net c.v. of coal) of p.f. and travelling grate stokers which has taken place in six months' operation. It will be noted that the gap between p.f. and chain grates has widened by 0·7 per cent.

The loss in the case of p.f. boilers is almost entirely due to higher gas temperature, but in travelling grate firing the increase is shared equally by increased gas temperature and increased carbon in ash. The reason for increased carbon in ash loss being experienced in deferred efficiency "B" tests on travelling grate stokers is not clear and no explanation is put forward. No significant change of CO_2 was recorded for either type of plant. It was not considered appropriate to quote the figures for spreader stokers owing to their still experimental stage of development.

Choice of Firing Method

Efficiency is not the only consideration which has led to the almost exclusive use of pulverized fuel firing in large generating stations. The following are other important factors:—

(*a*) The economic necessity for the adoption of large boilers for which stoker firing by either chain grates or spreaders is unsuited. Pulverized fuel boilers will be capable of supplying future 200 MW re-heat turbines on the unit principle, whereas it is unlikely that stokers, chain grates or spreaders, could be developed for coping with a turbine much larger than 30 MW.

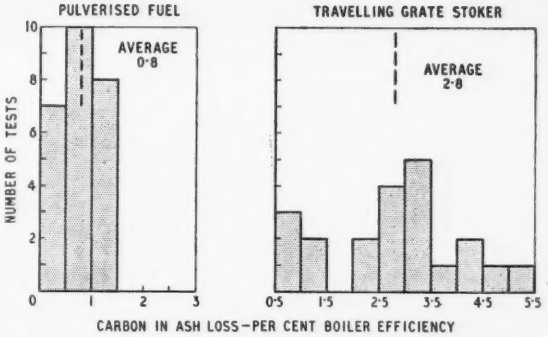


Fig. 8.—There is a more marked consistency in completion of combustion with p.f. boilers than with travelling grate boilers

(*b*) Present and future available qualities of coal. Quality will tend to deteriorate and uncertainty of source of supply in many cases requires plant to be capable of using a variety of types, grades and mixtures. Well designed p.f. boilers are less discriminating of coal quality and will maintain full output with good efficiency and availability when using much wider ranges of coals than would be possible with any type of stoker firing.

(*c*) Pulverized fuel boilers are more flexible and efficient for meeting fluctuating load demands.

(*d*) Less serious fouling of tube surfaces is experienced in p.f. boilers—a major consideration in ensuring the maximum availability of large boiler/turbine units.

One of the most valuable assets of travelling grate firing which may well amount to a reprieve on a small scale, is its suitability for burning coke breeze. It is unlikely that p.f. will compete economically with travelling grates in this sphere owing to the rapid rate of wear on milling equipment which is experienced when introducing even small quantities of coke mixed with the coal.

Latest Designs of p.f. Boilers

Fig. 7 shows a typical example of a p.f. fired radiant boiler of advanced design such as are being built now up to sizes capable of supplying 120 MW reheat turbines. A boiler of this type is considered to be able to attain the efficiency performance figures on test indicated in Table 1, these efficiencies having been calculated from the estimated losses given in Table 2. The claims made for this type of boiler are based on the performance of some particularly successful installations of latest design already in operation. The figures presuppose that the boiler is supplied with an average quality high volatile coal.

The firing arrangements will be by corner or horizontal intertube type burners, use of downward directed burners being more suitable for low volatile coals. Comparing the estimated figures for the latest design with those for the present average p.f. boiler performance it will be seen that the net efficiency on gross c.v. or " effective " efficiency is 1·5 per cent higher. There are several reasons for anticipating an efficiency increase of this magnitude. Improvements in the design of furnace and firing equipment will allow excess air to be reduced. It has already been found possible to operate certain types of boilers with a CO_2

Table 3.—Fall in Efficiency between A and B Tests

Method of Firing	Number of pairs of Tests	Drop in per cent Gross Efficiency on net C.V.	Increase in Final Gas temp. deg F	Increase in dry gas loss per cent	Increase in ash loss per cent
P.F.	6	0·5	18	0·5	Nil
C.G.S.	4	1·2	25	0·6	0·6

content of 15 per cent in the flue gas at the air heater outlet whilst maintaining carbon in ash below 3 per cent.

A reduction of final gas temperature will also be achieved. As mentioned earlier, the average gas temperature for present p.f. boilers is 15 deg F higher than for boilers fired by chain grates. It is considered that the more liberal furnace design and wider spaced superheater tubes of future p.f. boilers will reduce slagging and fouling troubles so that design gas temperatures are more likely to be realized and maintained. Economic considerations of capital cost will probably not favour boilers being designed for final gas temperatures much lower than 290 deg F.

The ash loss will be reduced below the present average. It was noted from test results on p.f. boilers that 11 out of a total of 25 tests considered returned a carbon in grit of 3 per cent or less, corresponding to an ash loss of less than 0·6 per cent. Fig. 8 also shows that seven test results gave an ash loss of 0·5 per cent or less. Finally, a small reduction of the percentage radiation loss and auxiliary power consumption will result from the adoption of larger boiler units. It is thought that technical developments will also tend to reduce auxiliary power consumption.

Slag-tap and cyclone fired boilers, popular in America, are considered unlikely to displace the dry bottom p.f. boilers in this country. Both types of firing are more selective of coal type; better availability due to greater freedom from fouling is doubtful, except perhaps with exceptionally difficult coals; they are less suitable for two-shift and peak load operation; it is difficult to see where any significant improvement in overall efficiency can be made. In this latter respect a slight reduction in dry gas loss due to less excess air and a further reduction in the already small carbon in ash loss may be achieved, but a once hoped for reduction in auxiliary power consumption is considered unlikely to be realized with either type.

The efficiency attained by boilers fired by different methods having been shown and the reason for and extent of the variations given, it now remains to indicate to what extent the performance of a power station is affected. For this purpose, which is a comparative one, the last two columns of Table 1 have been provided to show the effect of the different boilers on the thermal efficiency (units sent out basis) of power stations having the two most commonly used pressure and temperature cycles—600 lb/sq in at 800 deg F and 900 lb/sq in at 900 deg F. The arbitrary but realistic figures of 26·5 per cent and 29·0 per cent, respectively, have been chosen for hypothetical stations equipped with p.f. boilers of average efficiency. These figures are then adjusted for the lower efficiency of the other firing methods.

The improvement resulting from the higher efficiency of the latest types of p.f. boilers is calculated on the same basis and is also shown in Table 1. No further foreseeable development in boiler firing technique is considered likely to increase boiler efficiency beyond this point sufficiently to influence the thermal efficiency of generating stations to any significant extent.

Acknowledgment is due to the British Electricity Authority for access to records of official tests on which the figures given in this survey are based.

TURBINE-SHAFT DISTORTION

TWO papers with numerous relevant diagrams on the design of and operating experience with methods of measuring temporary eccentricity of rotor shafts of modern steam turbines during starting operations or sudden load variations were presented on Wednesday at a joint meeting of the Institutions of Electrical and Mechanical Engineers. The first, by Messrs. D. Antrich, H. W. B. Gardiner and R. K. Hilton (General Electric Co.), described equipment which has been in use (without needing maintenance) since December, 1952, on two 60 MW turbines at Uskmouth power station, South Wales.

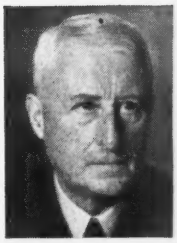
The main functions of the equipment, the authors stated, were twofold. They were, first, to indicate and record axle differential expansion of the shaft in relation to the high-pressure casing resulting from the more rapid changes of temperature of the rotor due to its smaller weight and heat capacity. Secondly they were intended to reveal the motion of the shaft centre at the end of the h.p. rotor in relation to the bearing housing, which might be due to such causes as misalignment, instability of bearing oil-film or incorrect barring procedure. A distinctive requirement of the equipment was that its life and reliability should equal that of heavy power station plant.

All measurements were made electromagnetically on a steel disc at the end of the shaft overhanging the outboard bearing. Around the disc were three pairs of iron-cored coils, supported from the bearing housing which formed components of a bridge circuit, to which power was supplied at 120 V from a 1 h.p. three-phase 1,000 c/s alternator (i.e., the requisite minimum of twenty times the system frequency). Variations in the system frequency of from 47·5 to 51 c/s changed the voltage of the inductor alternator by 8 per cent but the readings obtained by not more than 1 per cent. Identical circuits were used for detecting vertical and horizontal components of any radial motion. An additional unit had been developed for occasional use which recorded the turbine speed, thus correlating it with disturbances of the shaft. A cathode ray oscillograph plugged into the measuring circuits produced on the screen a polar diagram of the motion of the end of the shaft.

The second paper, by Messrs. J. L. Ashworth (B.E.A.), J. S. Hall and A. H. Gray (Metropolitan-Vickers Electrical Co.), also dealt with electrical turbovisory gear which gave a continuous record of rotor behaviour. Sixty sets of equipment of the type described in detail were said to be now in use, some for the past nine years. A variable inductance method had been adopted for measurement of both axial expansion and shaft deflection. In the latter case the electrical problem posed by changes from low to high speeds of the turbine had been solved by switching in additional components. The most important item of the equipment was perhaps the sensitive eccentricity indicator which gave the driver advance warning of the onset of noticeable vibration, particularly at low speeds when running up. Its accuracy was probably within 0·001in at low speeds.

The vibration detector consisted of a mass of soft iron suspended on flat springs between the pole faces of a U-shaped laminated core, thus being free to move in one direction of a horizontal plane. A small permanent magnet was fixed to the base of the detector, and the magnetic circuit was completed through the soft iron mass and through the laminated core, on which search coils were wound. Movement between the soft iron and the laminated core induced voltage proportional to the displacement of the base of the detector relative to the amplitude of vibration. Hence each bearing could be examined in turn for in-line and transverse vibration. Particulars were also given of the use of turbovisory equipment as an aid to reducing the starting time of a 15 MW gas turbine. A former running-up period of 1 hr 32 min became 34 min and a loading time to 6 MW of 1 hr 15 min was lowered to 37 min to reach 10 MW.

Order in the Industry



The Fair Trading Council Comes of Age

By V. WATLINGTON, M.B.E., A.C.G.I., M.I.E.E.
(Chairman, Electrical Fair Trading Council)

THE reasons which indicated the necessity for a code of trading practice and the history of the early efforts of the so-styled "Committee D" to bring it into effect have been described in an article by Mr. A. S. Lowe in last week's issue.

The Electrical Fair Trading Policy has an accepted place in the electrical industry to-day, but it is doubtful if many realize that the Fair Trading Council was set up in October, 1933, and that the first edition of the Policy was printed and distributed widely as far back as May, 1936. The principles of the Policy have thus been available for guidance for twenty-one years.

The Electrical Fair Trading Council thought this would be a convenient time to examine the aims and objects of the Policy, and to assess the results which have been obtained. It has gladly availed itself of this opportunity to restate the main features of the Policy, and to emphasize important aspects in which it differs from the usual types of trading codes.

In many industries there have been trading codes based on undertakings to work by the rules, coupled with machinery for enforcing those rules by penalties. The Electrical Fair Trading Policy differs from agreements of this type because, while it consists of a set of rules produced by practical people engaged in the industry, it demands no undertakings from anyone using the code as a basis for trading and there is no system of enforcement. The Policy is available to the whole of the electrical industry—manufacturers and distributors alike—whether or not they are members of trade associations, and copies are supplied at the cost of actual printing.

This attempt to create a "conscience" which would restrain individuals from actions which were neither in the true interest of the industry, nor of the actual users, was a very revolutionary idea. When it was first suggested, many sincere critics regarded it as utopian in concept and bound to fail in practice. It was, however, decided to try the experiment, and the results have shown beyond doubt that it has been a success. There are always some individuals who evade rules if they find them irksome, and even the creation of a "conscience" cannot prevent some lapses from the path of virtue.

Ethical Considerations

The aims of the Policy remain to-day as they were adopted at its inception, and can be summarized as follows:—

> Ensuring that the functions of each section of the industry are defined and understood, and that each receives the fair reward of its labour, to the end that equity and fair dealing shall prevail throughout the industry, that the public shall be well served, and the cause of electricity advanced.

The Policy itself lays down the general principles of good trading practice based on experience and consultation between manufacturers and distributors. It clearly defines the qualifications and functions of all engaged in the manufacture and distribution of the products to which the Policy applies.

The operation of the Policy rests fundamentally on the measurement of the services rendered by the various sections in the pattern of distribution. That measurement is based on the functions performed by those engaging in distribution, and as defined in the Policy, in stocking, displaying, distributing and servicing electrical products. It is an essential feature of the Policy that the parties shall actually render service in the handling of the products and not merely act as intermediaries by passing on orders.

The measurement of service is expressed in terms of a percentage discount, and accordingly it is essential that list prices shall be established for all products within the scope of the Policy in order that agreed discounts may be applied. Let it be emphasized that the Fair Trading Council has no part in the fixing of list prices; they are fixed at the absolute discretion of the manufacturer, or by the wholesaler where he is given exclusive control of the product in question.

No attempt is made in the Policy to establish the wholesaler's remuneration for his part in the distribution scheme. It is realized that this discount will depend on the service which he renders to an individual manufacturer, and the matter is thus left as one of mutual arrangement. To qualify for wholesale terms, however, it is essential that the trader shall be engaged in genuine wholesale distribution and the Policy definition lays down very precisely what the yardstick is in this matter.

The orderly and defined system of trading which has resulted from this code of ethics has benefited everyone concerned in the industry and not least of all, the ultimate consumer.

Policy Schedules

Printed with the Policy are Schedules which set out the details of the discounts and special conditions applicable to particular products. These Schedules are prepared by the manufacturers and are accepted by the Council as appendices to the Policy after they have been approved as complying with the general principles of the Policy.

At present twelve Schedules appear in the Policy. They embrace a wide variety of products ranging from the accessories and switchgear used for installation purposes, to lighting fittings and the various types of domestic appliances.

The electricity supply industry comprising the British Electricity Authority and the Area Boards are not members of the Council. It is pleasing to record nevertheless that the British Electricity Authority has always recognized the Council as an appropriate body with whom the Area Boards could collaborate and the past six years have seen this borne out in actual practice. It is fortunate that the supply industry should regard the Council as an ally in the distribution of electrical products.

The Future

What of the future? The industry will obviously continue to expand, and the work of the Council should become increasingly important. This work can only continue to be successful if all sections continue to consult

and collaborate round one common table in order to reach a solution to their problems or at least to determine the greatest common measure of agreement thereon. The value of consultation before any action is initiated cannot be compared with any substitute which may take place after a *fait accompli*. Further, vigilance must be exercised to preserve the trading principles of our industry which have been developed, established and maintained in the light of many years of practical experience.

A new generation has of course entered the industry since the Policy was first published, and it is difficult for the newcomers to appreciate that in the early days of Committee "D," the total amount of electricity generated was but 7,000 million kWh a year, compared with to-day's figure of 66,000 million.

The industry has always leaned towards orderly and regular trading, as those who remember the early codes introduced by the Cable Makers' Association and the Electric Lamp Manufacturers' Association at the beginning of the present century, will testify. With the rapid growth of the industry there was clearly a need for a central body to see that all of those engaged in the industry were rewarded on a fair and equitable basis, and that the public were protected.

The Fair Trading Council developing and expanding its Policy over these 21 years, makes due acknowledgment of the work of the pioneer associations. The Council can, with modesty, claim that a large measure of success has been achieved, and the good relationships which exist to-day between the various sections augur well for the future.

T.V.A. UNDER FIRE

By C. F. MATTHEWS, B.Sc., A.M.I.E.E.

A Record Difficult to Assail

IT was reported from Washington last week that the Congressional Joint Atomic Energy Committee has decided to permit the authorities to proceed with the Dixon-Yates project without awaiting the approval of Congress. The project is the erection of a thermal station at a cost of $107 million to provide power to the Atomic Energy Commission. Opponents of the scheme contended that the Tennessee Valley Authority should have been given the contract for the supply of power to the A.E.C. In fact the matter has been a contest between advocates of private enterprise in electricity supply and those who favour public ownership. The proposed power plant is now to be built in Arkansas, just outside the T.V.A. area, and it is estimated that power will cost the A.E.C. about $3½ million a year more than if bought from the T.V.A. system. The rejoinder of exponents of private supply systems is that the T.V.A. pays no taxes and to this extent the taxpayer will benefit. This argument, though not strictly correct, is played as a trump card.

Financial Policy Vindicated

It is well over a decade since the Joint Committee of Congress which investigated the T.V.A. gave the Authority a clean bill of health. The T.V.A., it was said, could never find markets in depressed Tennessee to justify its ambitious generating programme. When this statement was falsified, the argument switched to the charge that electricity was sold at uneconomically low prices.

But here the Investigating Committee pointed out that electricity passed through two distinct stages: the bulk supply stage in the hands of the T.V.A., and the retail stage in which independent undertakings sold electricity at tariffs stipulated by the T.V.A. "The Committee finds," the report says, "that it is essential to recognize a gateway between the Authority and local distributors. On one side is the Authority with its internal costs, selling price, and profit and loss. These are important to the Authority, and are duly considered in this Report where it is shown that the tariffs are more than sufficient to cover the Authority's power costs. They have no real relation, however, to the retail yardstick. That is found on the other side of the gateway where power is bought at wholesale and sold retail."

In short, both the wholesaling T.V.A., and the retailing distributors were held to be financially correct, a fact borne out to-day by the average of 4·1 per cent net return on the T.V.A.'s power investment over the past 20 years, and the more lucrative return of the retailers who, for instance, had an average net return of 7 per cent on investments in 1953.

One interesting result of the T.V.A.'s dynamic selling policy is its stimulating effect on neighbouring power companies. The financial data of the Federal Power Commission shows that from 1937 to 1952 the annual common stock earnings of the nation's privately owned utilities doubled, while their common stock increased by 40 per cent. Over the same period the common stock earnings of the nine companies adjoining T.V.A. multiplied five times, and their common stock increased by 50 per cent.

An illuminating comment in *Business Week* referring to the Arkansas Power Co.'s chairman, said "Ham Moses has been afraid of something like an Arkansas T.V.A. for 20 years. He has fought it by pushing rural electrification, by selling power cheaper than the Government's power systems could, and by building Arkansas." The redoubtable Ham sells as cheaply as the T.V.A. system, pays his taxes, *and makes money*—three irreconcilables by some reckonings.

Increased Tax Revenue

The truth is, however, that the T.V.A., too, is paying taxes. It is required to repay the U.S. Treasurer 2½ per cent per annum of the borrowed money. Since 1948 it has exceeded the requisite repayment by $9 million. To the states and counties it pays, in lieu of taxes, 5 per cent of its gross revenues from sales of power. In 1953, T.V.A. and local distributors paid 151 per cent more in local taxes than was paid in the same area in 1937 by private distributors. The present combined payment of T.V.A. and local distributors amounts to 6 per cent on total revenue, while neighbouring utilities pay 7·9 per cent average. Not only that, but further increase in local authority and national revenues can be gauged from the fact that the people of the Valley paid 6·2 per cent of the total individual income taxes of the United States in 1952 as against a 3·4 per cent share of the 1933 amount.

Referring to this particular controversy, Mr. H. S. Peron, consulting engineer, Rural Electrification Administration, said "The public power movement is considered a menace by commercial companies, and they feel they can afford great expense for combating it. The director of their Washington office is reputed to be the highest salaried lobbyist at the seat of Government." He added that "Notable is their policy in advertising to refer to themselves as 'business-managed, tax paying enterprises' thus implying that bodies such as the R.E.A. and T.V.A. are not soundly managed, nor pay taxes. . . . Big names are brought into the fight and weird arguments and statistics are presented."

New ground was certainly broken, from initial stages, in T.V.A.'s relations with political lobbyists. One of the first casualties was jobs by patronage—that well entrenched U.S tradition. Even as regards labourers, entry into T.V.A. is by examination, admission to which is the application on the now famous "Form 10." To the scores of thousands who have filled it in, Form 10 has become a symbol that T.V.A. is a different kind of public agency; that merit, skill and integrity are the only factors considered.

The recent victory of lobbyists over the location of the A.E.C. plant at Paducah, Kentucky, will force T.V.A. to revise its estimate of plant requirements. A preliminary estimate for 1957 furnished the staggering figure of 26,500 million kWh per annum sold to these agencies alone, or more power than was taken by any of the States except New York. With the limit being reached for hydro generation, about 60 per cent of T.V.A. system's 10,000 MW of installed capacity will, by late 1956, be in steam plant. This will include Kingston near Oak Ridge with a rated capacity of 1,440 MW and a fuel consumption of slightly over 0·75 lb of coal per kWh. Excluding atomic and other large consumers, the 1958 output is expected to reach 21,900 million kWh, nearly double last year's figure.

Extent of Development

How much of the increased use is due to T.V.A.'s success as a resource development agency is another and fascinating story. Rapidly rising living standards and earning capacity have added their quota to the effect of cheap power. Provision of "know-how" and the stimulation of local initiative have been priceless contributions from this agency which possesses no compulsory powers in the planning field nor, contrary to popular belief, spent more than $2,216,000 on resource development in 1953.

More than 1,600 new industrial concerns have started operations in the Valley since 1929, of which no more than a handful moved in from outside. About 90 per cent of farms are now electrified and the 1,150,000 domestic consumers use at present an average of 4,400 kWh per annum, a figure which is close on the 5,000 mark which the Paley Commission on resources envisages as the U.S. average for 1975. The estimate of 18 kWh per man-hour in manufacturing for the same year has already been attained for the T.V.A. territory.

The tariffs accounting for high domestic demands are per month.—The first 50 kWh at 3·0 cents per kWh, the next 150 kWh at 2·0 cents per kWh, the next 200 kWh at 1·0 cent per kWh, and the next 1,000 kWh at 0·4 cent per kWh. All additional kWh at 0·75 cent per kWh. These figures should be read with available information that Tennessee State, typical of the Valley area, though only 1·95 per cent of the U.S. population, purchases 2·66 per cent of the refrigerators, 3·44 per cent of water heaters, and 5·53 per cent of cookers.

The financial results of T.V.A. power operations can be summarized as follows:—

	Millions of Dollars 1933 *to* 1953
Revenue	$695
Expenses:	
Operation and Maintenance	$294
Taxes	30
Depreciation	136
Total Expenses	$460
Net Income Before Interest	$235*
Investment Assignable to Power (20-year average)	$290
Annual Return on Investment (20-year average)	4·1 per cent

* Of the $235·3 million net income before interest shown above $9·5 million has been used to pay interest on bonds, $31·1 million has been used to retire bonds, and $50·1 million has been paid into the Federal Treasury as an offset to appropriations previously made. The remainder, $144·6 million, has been reinvested in power facilities.

COST OF PRODUCING AND MARKETING ELECTRIC POWER: MILLS PER KWH OF ENERGY SOLD

	T.V.A. Area (Financial Year 1953)	*Privately Owned Utilities in U.S. (Calendar Year 1952)*	*T.V.A. Area Costs as approx. per cent of Privately Owned Utilities*
Production	2·3	4·8	50
Transmission & Distribution	0·9	1·8	50
Customer Accounts & Collection	0·2	0·6	40
Sales Promotion	0·1	0·3	30
Administration & General	0·5	1·1	40
Depreciation	1·4	1·5	90
Total Expenses	5·4	10·1	54

The facts have brought, to some, a belated recognition that T.V.A. is a feasible idea. Much of the antagonism springs from unfamiliarity with this new approach to resource development, and from a fear that governmental functions may push further into an area of decision reserved for private individuals. Others, by virtue of T.V.A.'s emphasis on decentralization and its necessary reliance on co-operation not compulsion, read into it a reversal of this trend.

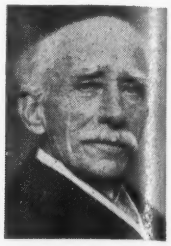
Great credit is due to the past-chairmen of the T.V.A., Messrs. Lilienthal and Clapp, to whom the Authority and the whole of the Tennessee Valley area owe much.

Street Cleansing Comparisons

IN a recent paper, Mr. T. B. Finnie, assistant director of cleansing, Glasgow, gave the results of tests in operating mechanical sweeper-collectors and electrically propelled pedestrian controlled trucks. Two tests were made in areas with a daily and a weekly sweeping. The cost per mile swept by the mechanical sweeper-collector was practically constant (10s 4d for daily sweeping and 10s 1½d for weekly sweeping). With the pedestrian controlled vehicle the cost per mile swept varied from 5s 11d for daily frequency to 7s 4d for weekly sweeping. This was entirely due to time lost in travelling from the depot to the starting point. The main advantage in the use of pedestrian controlled vehicles was where they were operated near to the depots, but they still compared favourably for a two mile radius.

The Thermionic Valve

Jubilee Celebrations in London



Sir Ambrose Fleming

ON Tuesday of last week, 16th November, it was just 50 years since Sir Ambrose Fleming filed the original patent for the thermionic valve and the occasion was marked by celebrations at the Institution of Electrical Engineers and University College, London.

At University College a plaque which had been erected to commemorate the life and work of Fleming, who was a former student and professor of the college, was unveiled by the Marquess of Salisbury, K.C., P.C., the Lord President of the Council, in the presence of Lady Fleming. The plaque adjoins the laboratory in which the valve was first applied to detect high-frequency radio waves. In this and other laboratories at the college an exhibition had been arranged to illustrate the development of the valve in full detail from Fleming's earliest device up to the most modern types which are used in radar and other similar equipment.

In the exhibition a number of instruments used by Fleming in his early experiments were assembled to emphasize the severe limitations under which his investigations had to be carried out. Side by side with these historical exhibits were shown examples of recent researches being pursued by the Department of Electrical Engineering of University College and it was evident that much of this work had grown out of the important contributions to high-frequency techniques for which Fleming was responsible. At the Institution of Electrical Engineers a comprehensive display of valves was also arranged covering developments very completely since 1904. Three lectures upon these developments were also delivered during the afternoon.

Fleming's Career

After the Marquess of Salisbury had opened the proceedings, Professor G. W. O. Howe, D.Sc., Emeritus Professor of Electrical Engineering, Glasgow University, speaking on "The Genesis of the Thermionic Valve," began by giving a picture of Fleming, who was little more than a name to most young engineers. He was born in 1849 at Lancaster, his father being a clergyman and a member of an old Scottish family of Flemish origin. At the age of five the family moved to London and when he was sixteen he became a science student at University College, completing his studies for the B.Sc. by part-time study while working as a clerk in a Stock Exchange office. After some experience as a schoolmaster and a period of study at the Royal College of Science, in 1877 he became a student again, at Cambridge, where he remained for four years under Clerk Maxwell. During part of that time Maxwell, who according to Fleming "was a teacher difficult to follow," had as his only audience Fleming and one other student, and on some occasions gave a lecture to Fleming alone.

In 1879 Fleming was awarded the D.Sc. of London University, and in the same year was appointed scientific adviser to the Edison Telephone Company. In 1882 he became "electrician" to the Edison Electric Light Company, and two years later went to America to discuss with Edison the difficulties of the electric lighting industry in England, which were largely due to restrictive legislation. In 1879 Edison had obtained a British patent for a carbon filament lamp of high resistance, and in 1884 exhibited at Philadelphia an interesting discovery which he had made the year before. He had fixed in the bulb of a carbon filament lamp a metal plate carried by a platinum wire sealed through the wall of the bulb, and he found that if the metal plate was connected through a galvanometer to the positive terminal of the filament the galvanometer showed that current was flowing, but if the connection was made to the negative terminal no current was indicated.

The "Edison Effect"

This was subsequently known as the "Edison effect." Edison put it to practical use, but not for telegraphy; he connected the lamp filament with a suitable resistance across the mains in the power station and used it to maintain the power station voltage constant. The Edison effect greatly interested Fleming, who got the Edison and Swan lamp works to make him a number of lamps with the metal plate of different sizes and shapes and in different positions with respect to the carbon filament. At first he came to the natural but erroneous conclusion that atoms of carbon carrying a charge of negative electricity were responsible for the current through the vacuum, but he then found that the hot cathode could be made of platinum instead of the carbon which Edison had used. It was not until 1889 that J. J. Thomson showed that the effect was due to the emission of electrons. "The second discovery I made," Fleming wrote, "was that negative electricity from any battery could pass from the hot filament to the cold metal plate, but not in the opposite direction. The space between the filament and the metal plate is a one-way street for electricity." He described these experiments in lectures in 1890 and 1896, many years before he took out his patent.

In 1885 he was appointed Professor of Electrical Engineering at University College, London, and in 1899 became scientific adviser to the Marconi Company, and had much to do with the design and equipment of the station at Poldhu, from which the first transatlantic signal was transmitted in 1901. It was in October, 1904, that it suddenly occurred to him that the Edison effect could be used to rectify alternating currents of high frequency, and on 16th November he applied for a patent, which under his agreement with the Marconi Company became their property. He afterwards complained that, although the original inventor of the thermionic valve, he never received a penny for it.

The invention of the triode by Lee de Forest in 1905 was something for which Fleming never forgave him, and it led to much bitterness and litigation. Fleming had simply taken the Edison effect and applied it in a new way, as a rectifier of high frequency currents. It was in no way an intensifying device; and, while Fleming must have the credit of being the first to apply thermionic

phenomena to wireless detection, the intensifying properties of the present-day valve were more important than its rectifying properties. His invention made no outstanding contribution to the reception of wireless signals, and de Forest was probably right in claiming that he did not know of the Fleming patent at the time he applied for his own. The first patent of de Forest was for amplification; it was some months later that he stated that he claimed for "wireless telegraph receivers or oscillation detectors." Owing to financial difficulties de Forest allowed his British patent to lapse, while in the U.S.A. the courts decided that de Forest could not make three-electrode valves without infringing the Fleming patent, and that the Marconi Company could not do so without infringing the de Forest patent, with the result that the industry was in a tangled mess until the Fleming patent expired in 1922. That was not the end of the story, because in 1943 the American Supreme Court decided that the Fleming patent had been invalid from the beginning, since the claim was not limited to high frequencies, and so was for more than he had invented.

Thermionic Devices

Sir Edward Appleton, Principal and Vice-Chancellor of Edinburgh University, next dealt with thermionic devices from the development of the triode up to 1939. He said that a really great invention might be defined by saying that people understood how it worked only after its action had been explained to them. He believed that the three-electrode valve came into that category, and indeed de Forest, its inventor, did not know how it worked, at first. It was some years before its mode of operation and potentialities were recognized.

There could be no doubt that Lee de Forest put the third electrode into the Fleming valve. Claim 3 of his 1908 patent was perfectly clear: "An oscillation detector comprising an evacuated vessel, two electrodes enclosed within said vessel, means for heating one of the said electrodes, and a grid-shaped member of conducting material enclosed within said vessel and interposed between said electrodes."

Although de Forest spoke of "an evacuated vessel," this phrase must be interpreted in terms of the possibilities at the time, since the vacuum conditions attainable were poor. In his 1908 patent his receiving circuit was shown with a grid condenser but without a grid leak and without a battery, so he must be credited with the invention of what was now called cumulative grid rectification. The fact that no grid leak was present confirmed the suggestion that his tubes contained a considerable quantity of gas, so the internal path between filament and grid was partially conducting, due to the presence of both positive ions and electrons.

Although the "Audion" (as de Forest called his three-electrode valve) was one of the great inventions of history, some years elapsed before its mode of operation and possibilities were appreciated. Although in 1911 von Leiben demonstrated his own three-electrode valve before a German scientific society, the main stream of triode development in the early days (later it shifted) was American. There were two factors involved: the experiments carried out by E. H. Armstrong to elucidate the operating features of the Audion, and the work of Langmuir and his colleagues in producing real vacuum tubes with internal pressures a thousand times smaller than had been previously attained and introducing what he called a pure electron discharge. Langmuir readily admitted that he based his work on that of Sir Owen Richardson, who was present at the meeting.

Meanwhile British workers had not been idle, though they did not publish as extensively as the Americans. Pioneer radio workers such as H. J. Round and C. S. Franklin (both of whom were present) had access to German developments of the Leiben-Reisz tube, and Round, working on hard valves, produced the famous V24 and Q valves. The British work of this period was notably directed to circuit needs. In 1912 C. S. Franklin discovered the phenomenon of retroaction or feedback for h.f. amplification, and in 1913 Round described an oscillating receiving valve circuit generating its own oscillations.

The 1914–18 war was a period of intense three-electrode valve development. The war really killed the soft valve, because of the need for reliability and constancy in operation, as well as uniformity in performance between valves. As a result of wartime experience people began to understand how a valve worked and how its performance as a detector, amplifier and oscillation generator was determined by its internal physical dimensions and structure; they began to design valves on the drawing-board. The limitations of the triode were recognized, one of them being the electrostatic capacity between the grid and the anode within the valve, which resulted in uncontrollable reaction between the output and input circuits. It was in 1926 that Captain Round brought the screen grid valve into practical use with his famous S625, and this was developed until the undesired capacity between control grid and anode could be cut down to 0·001 $\mu\mu$F. This raised the problem of secondary emission. The substantial suppression of secondary emission in a tetrode was not easy, and the most common way of effecting it was by the inclusion of a suppressor grid, as in the pentode. Pentodes had become popular before 1939 for both h.f. and l.f. amplification. Another type requiring special mention was the variable mu valve, which permitted the output of a receiver to be adjusted to any desired level without distortion when receiving strong or weak signals.

During the period up to 1939 Fleming's two-electrode valve had been employed almost solely as a power rectifier in a.c. mains operated sets, but towards the end of the period it came back into use as a h.f. detector and also, by means of a suitable circuit, as an automatic control of the grid bias with variable mu valves, permitting the output circuit of the receiver to be maintained at a sensibly constant level. This led to more complicated types of electrode structure such as double-diodes and double-diode-pentodes, hexodes and so on, but these introduced no new principle.

Three-Electrode Valve

An important development of the three-electrode valve which occurred well before 1939 was the electrometer triode, in which the insulation of the grid was increased nearly a million times, to 10^{15} ohms. By 1939 the triode and its descendants had vastly expanded the scope of the most natural mode of communication, by voice and ear. It had become the primary component of radar and television and one of the most important tools of scientific research, and it was becoming clear that its astonishing and versatile properties would lead to its adoption in vaster fields of human inquiry and endeavour, remote from those which gave it birth.

The last of the three lectures, which dealt with developments in thermionic devices since 1939, was given by Dr. J. Thomson, Deputy Director of Physical Research at the Admiralty. The active part of any electronic device, he said, was essentially a means of transforming one form of electrical energy to another, and but for the importance of usage in engineering technology the term "energy transformer" might be more useful than many others which were applied to valve functions. Both the

distorting action and the amplifying action of the valve could be imitated by other mechanisms. The valve was an amplifier-distorter similar to an engine or dynamo or alternator, but unique in being able to respond to very rapid fluctuations. The physicist was still baffled, however, in trying to account for the simple electronic properties; there was no concept of the electron which was self-consistent and could be used universally. When such a concept was established (as it would be) a new era of electronic research and development would be opened.

One of the most interesting lines of research might be in the direction of still further increasing its speed of response to a small electrical stimulus. The transit time of the electron in the valve became important at frequencies of 200–300 Mc/s, and an important advance had been made when the principle of velocity modulation was enunciated in the early 1930s, this representing the first realization of a new way of coupling an electron stream to an electromagnetic field.

Most electronic engineers would agree that the conventional transmitter and receiver design used at radio frequencies had much to recommend it, and that a wide band amplifier was a good starting point for a transmitter or receiver. The advances made in valve design since 1939 were rapidly leading to the point where wide band amplifiers of adequate power gain and efficiency were available for transmitters at all wavelengths down to millimetre waves, while superheterodyne receivers tunable over an octave and having noise factors of only a few decibels were available over the same band of frequencies. This meant that conventional electrical engineering could be applied to the microwave region of the spectrum.

Klystron Amplifier

Dr. Thomson then went on to describe specific valves which could be used on microwavelengths. It was interesting to consider, he said, the possibilities of low and high level modulation for transmitting amplifiers. The klystron, for example, could be linearly modulated almost up to 100 per cent if the modulation was high level, but there was no fundamental reason to suppose that low-level modulation of the klystron was impossible, and a microwave system using low-level modulation and having a reasonable bandwidth would be a valuable tool for the radio engineer. Since a klystron could give a gain of 1,000, such a device would be a d.c. amplifier of outstanding performance.

He illustrated a klystron amplifier to operate at a wavelength of 30 cm and 1,000 Mc/s, which might be useful for colour television. Its efficiency was over 40 per cent, and it could be pulse-modulated at low level. It was the first British valve to use low-level pulse modulation. He also showed a travelling wave tube operating at 7·5 cm and used by the Post Office, which was the first travelling wave tube to be used anywhere in the world in a relay system.

There were two possibilities open to anyone who wished to invent a new valve: either to invent a new way of coupling an electron stream to the electromagnetic circuit, which was extremely difficult, or to find some more efficient way of using known methods. That would be feasible with velocity variation, where efficiencies were low, but would be difficult with space charge modulation, because the efficiency of a good Class C amplifier with space charge modulation was over 90 per cent.

For use in factories, in aircraft and other positions where shock and vibration were important the ordinary valve used in domestic radio was not robust enough. The valve manufacturers of this country had been engaged on a very serious attempt to make their products at least as reliable as their mechanical counterparts and deserved great credit for their success. The vibrational forces to which valves might be subjected involved accelerations equal to 20 g, and for conditions of vibration and shock the materials had to be carefully chosen; mica insulators, for instance, were liable to be damaged. Searches were being made continuously for more satisfactory electrode and insulating materials. The communication engineer wanted valves with a life of 100,000 hours. The work of the P.O. Research Station had given a much better understanding of the factors influencing the life of an oxide cathode and shown the way to develop valves of exceptionally long life. The British industry was well ahead in this field. Future research must include a serious attempt to use new materials for general purpose valves. It had been found that if valves were baked at 700–800 deg C the emission of the cathode and the life of the valve were greatly improved. Research into new valve materials would pay large dividends, though the present materials for domestic valves were completely adequate.

At one time it was believed that the transistor was inherently more reliable than the thermionic valve could ever be, but enough was now known of solid physics and the problems of transistor manufacture to say that it was not possible to confirm that view. All the good work put into making valves was liable to be made completely nugatory by some " ham-handed " engineer on the equipment side.

Dr. Thomson illustrated a cold cathode counting tube for use in a computer and capable of 20,000 counts a second, and a storage tube capable of storing 1,500 signals, but added " never use a valve storage tube, a cathode-ray tube or anything to do with the electron if you can avoid it, but for high speed there is nothing else that will do the job."

Church Heating

THE British Electrical Development Association was one of the organizations which assisted the Central Council for the Care of Churches in the preparation of a booklet on " Church Heating " (17 pp.) which has been published for the Council by the Church Information Board, Church House, Westminster, S.W.1. It is a simple and less detailed version of a fuller report on the subject, but it sets out the general principles and the main features of various systems.

It is shown that each case needs to be considered individually by the architect, the church authorities, the engineer and, in special cases, the scientist. After some notes on architectural considerations there is a brief statement of the principles of heat transference and some guidance in the selection of heating systems.

There follow particulars of the various systems. In the section on electric heating it is stated:—

> " Electricity is advantageous for heating by virtue of its rapid response to control, but is more suitable for personal comfort heating than for warming the structure of the church itself. Installation costs compare favourably with those of a low-pressure hot-water system, but the comparative running costs, even allowing for the exclusion of labour charges, may be higher. When a reasonable electricity tariff is available (not exceeding 1d per unit) this form of heating may be considered for churches having similar conditions to those referred to under ' Gas heating installations ' and, of course, for those where gas is not available. It should not be considered for churches which require continuous heating. Nor is electricity economical for systems which do not make the maximum use of the flexibility of this source of heat, such as hot-water systems."

Four forms of electric heating are referred to and the necessity of ensuring adequate loading is stressed. A section on the care and maintenance of installations includes notes on the care of electric heating systems.

Public Works Exhibition

New Electrical Aids for Contractors

CHIEF electrical interest at last week's Public Works and Municipal Services Congress and Exhibition held at Olympia, London, centred first on new apparatus aiming at simplifying and accelerating the work of contractors and secondly on plant for supplying the necessary electrical power. Hoists, cranes, conveyors, loaders, stone crushers, graders, washers, mixers, vibrators, compressors and pumps are just a few of the items which are now quite commonly electrically driven, not only when employed in permanent fixed situations but also even in mobile installations.

Some of the plant shown was of an exceedingly involved nature, necessitating complicated control systems. A typical example was a 60 cu ft tar or bituminous macadam mixing unit made by Stothert & Pitt, Ltd. In this the graded batches of material are automatically assembled in any proportion of any combination of sizes by electric graders and pass on to the check weigh hopper. This hopper has a controlled discharge to the batch heater which is equipped with oil burning apparatus to heat the batch to any desired temperature up to 300 deg F. The discharge from the heater to the double shaft paddle type mixer is controlled by a movable chute and the mixed batch is discharged through a full width door. Provision is made for the addition of filler, binder and fluxing oil. The various operations are automatically controlled either electrically or electro-pneumatically, and are so interlinked and timed that by pressing one button the whole cycle of operations will be completed.

The screening of such materials as clay grog has hitherto presented considerable difficulties. Pegson, Ltd., however, have now produced, it is believed for the first time in this country, a vibrating screen (10ft by 4ft) fitted with a heated mesh deck. It has a maximum temperature of 60 deg C and a loading of 10–25 kVA. Operating at 15–8 V, it is completely safe to use. One of the most comprehensive displays of contractors' equipment and tools generally was to be seen on the George Cohen stand.

Hammer Improvements

Important improvements giving greater efficiency and longer life have been incorporated in the Kango electric hammers, spade hammers and ballast tampers. A new totally enclosed transmitter in the " E " and " F " hammers has a built-in tool retainer. The new " H " breaker, which is much larger and more powerful than any previous Kango hammer, is designed primarily for heavy duty concrete breaking and similar work: it has a loading of about 1½ kW. The German-made Bosch combined drill and chiselling hammers are now being reintroduced by the Tarpen Engineering Co., Ltd., who showed also the " Tarplaner " electric hand plane and " Swiftsure " portable electric saw, as well as grass, hedge and verge trimming machines. A glass beveller and an orbital sander were the latest items demonstrated by the Flextol Engineering Co., Ltd., and an electric pipe cutting machine was seen among Abbott, Birks & Co.'s display, together with portable lighting equipment and clamps for preventing leakage from lead jointed mains.

Though not electrically operated, the cartridge fired hammer gun has many and increasing applications in the electrical industry. It saves a great deal of labour, time and money by eliminating cutting, drilling and hammering and is now being much used for fixing saddles to conduit, and also bolts for carrying cable trays, switchgear, etc., to concrete, brick or rolled steel joists.

Among the many types of these hammer guns shown is a very versatile " Flash-hammer " tool kit introduced by Condrup, Ltd., incorporating the latest interchangeable barrel assembly which provides means of fixing either nails, internally threaded plugs ($\frac{1}{8}$in, $\frac{1}{4}$in and $\frac{5}{16}$in) or bolts ($\frac{5}{32}$in, $\frac{1}{4}$in, $\frac{5}{16}$in and $\frac{3}{8}$in Whitworth): the kit is supplied complete with all maintenance tools in a steel fitted case. New " Rapid Hammer " tools developed by Adam & Harvey (Rapid Hammer), Ltd., are practically silent and can be used even indoors with very little noise effect. A universal protective shield permits safe working even in corners and other awkward situations. The larger model is now being made to use ½in dia bolts in addition to the normal ¼in and ⅜in. The range of bolts available has also been enlarged and several types have been developed to meet customers' particular requirements. The " Superdynamic " power driving tool was again demonstrated by F. H. Bourner & Co. (Engineers), Ltd., and other manufacturers of this type of equipment included the Langham Export Co., Ltd. (" Fix-Rammer ") and Roura & Forgas (" Tornado ").

Portable illuminated bollards, flashing beacon lights and traffic signals for use while road work is in progress were well represented by George Pike, Ltd., Bergo, Ltd., George Cohen, Sons & Co., Ltd., Petbow, Ltd., the Forest City Electric Co., Ltd., Gowshall, Ltd. (who drew special attention to their new G.55 illuminated guard post), and Franco Traffic Signs, Ltd. (who showed the new 4E bollard and the " Exlite " external lighting fittings). Prestressed concrete lighting columns were displayed by the Stanton Ironworks Co., Ltd., while tubular steel lighting columns were exhibited by Stewarts & Lloyds, Ltd. Apart from flasher units for pedestrian crossings, the Horstmann Gear Co., Ltd., showed a full range of automatic control equipment for street lighting.

Mobile Generating Plant

Among the transportable generating plant on view an item of very special interest was to be seen on the Petbow stand where there was a prototype of a portable mains power gas turbine generating set. Utilizing an industrialized model of the Rover engine which powered the first turbine driven car, the unit generates 50 kVA at 440 V three-phase yet weighs fully equipped less than 1,000 lb compared with 3 tons for a comparable diesel engined set of orthodox design. Also included in the comprehensive Petbow display was the " Vulcan 75 " 94 kVA, 440 V skid-mounted mobile diesel generating set, the first to be driven by a Rolls Royce 6-cylinder oil engine.

With more than twenty examples of petrol, vaporizing oil and diesel engines manufactured by R. A. Lister & Co., Ltd., and Blackstone & Co., Ltd., were electric generating sets, including the " Start-O-Matic " plants, and deep and shallow well pumps. The display of F. Perkins, Ltd., included a power pack for industrial applications with a horsepower range up to 53 b.h.p. and 1,800 r.p.m., and various pedestal and bearer mounted diesel engines. In addition to McLaren, Petters and Mirrlees, Bickerton & Day petrol and diesel engines, the Brush Group exhibit contained examples of induction motors from 1 to 3,000 h.p., standard dimension motors, a 1½ kVA square path alternator, a 12½ h.p. drip-proof hollow shaft motor, h.r.c. cartridge fuse links and fuse switchgear for 440 V distribution systems. Frank Parker & Co., Ltd., showed portable lighting sets, while Hampson Industries, Ltd., included in their display 500 W and 1,000 W petrol and 3 kVA diesel generating sets.

Refuse collection is one of those services for which the battery electric vehicle is well adapted and models with specially designed bodies were exhibited by Lewin Road Sweepers, Ltd., the Harborough Construction Co., Ltd., and Sidney Holes Electric Vehicles. Of interest in

connection with all types of vehicles, electric, petrol or diesel, are the Acrow electromagnetically operated garage doors which open automatically as the vehicle approaches.

Turning to more domestic applications of electricity in the public works field, the British Electrical Development Association dealt with economical electrical installations in relation to electricity's "Four Foundations of Modern Living"—the cooker, water heater, refrigerator and washing machine. Two exhibits showed moderately priced equipment, particularly for use in municipal housing schemes. Other displays indicated the "four foundations" in various size and price ranges, as they might be installed in private houses, according to their size and the owners' incomes. As economy is of so much importance in the equipping of any municipal housing scheme, another section drew attention to the convenience of socket outlets. The remainder of the stand showed the advantages of the 13 A standard plug and socket as compared with the conventional types of varying sizes.

Iron and Steel Research

TO give members of the iron and steel and associated industries an opportunity of seeing something of the work of the British Iron and Steel Research Association's London Group, two open days were held at the Battersea Laboratories last week. Dealing mainly with the work of the Plant Engineering Division, the Iron Making Division, the Physics and Chemistry Departments and the Operational Research Section, the display showed a number of the many investigations which are being made in search of greater efficiency. The exhibits extended over the fields of heavy engineering, new steel-making techniques, and the chemistry of iron and steel, to electronics and the problem of corrosion.

During our tour of the laboratories we saw evidence of the progress which has been made in the adaptation of gas turbines for blast furnace use. The principle offers possibilities for considerable economies, as blast-furnace gas, an ideal fuel, is readily available. Gas turbine units would make it possible to eliminate costly boiler plant and condensers, and by the incorporation of a heat-exchange system it would further be possible to dispense with Cowper stoves. If heating can be incorporated in the blowing cycle, stack losses can be substantially reduced. Further development of the project will be a large scale operation, and the question is being studied in conjunction with the Iron and Steel Federation.

On the electrical side much work has been done in developing computors and recorders to handle the quantity of observations and data accumulated in many investigations. A new means of automatically recording data on tape has been developed, the tape then being fed into the computor and the results analysed with a great saving of time. Progress has already been made in converting input signals of many kinds into electrical impulses which can be converted into distinctive punch-marks in the tape. For measuring voltages a form of binary potentiometer is being constructed which periodically divides a varying voltage on the binary scale, at the same time operating the tape perforator head by means of relays. These and associated developments should prove of considerable practical value in steelworks in analysing operations. The speed and simplicity of the method could make possible fuller use of data already collected, and also make analysis of operations not yet undertaken easily feasible.

Another interesting project is directed towards improving the matching of intermittently loaded motors to their drives. Survey has shown that the temperatures of such mill-motors range from a few degrees above air temperature to a dangerously high level. In achieving more accuracy in the thermal rating of motors, the approach suggested by Professor Tustin of Birmingham University has been followed up. He pointed out that for a given constant condition of loading, the "heating value" is constant. It is, moreover, practicable to measure heating values in terms of temperature rise for all conditions likely to be met in practice. According to this method, the temperature rise of the motor for a given repetitive heating cycle is obtained from a summation of heating values of each of the short periods in which the loading remains constant.

Back-to-back heating-value tests are being performed on the test bed in the electrical laboratories. The tests are complicated, but once determined, only a knowledge of the duty cycle is required to form a reasonably accurate estimate of the insulation temperature of the motor under most conditions of loading.

Early work on cranes led to a study of master controllers, resulting in the production of an improved design. This allowed seven master controllers to be grouped within reach of the seated operator, with straight-line actuation of the handles in the direction of the motion controlled, thus giving "realism." The new controller has made it possible to improve the overall design of crane cabs, and a series of design criteria has been produced for the guidance of future designers. These studies helped to draw the industry's attention to the importance of the new science of ergonomics, involving the study of the relation between man and his working environment. In terms of B.I.S.R.A.'s immediate interests, this may be defined as fitting the machine or control to the man to increase working efficiency.

Other studies in ergonomics include an inquiry into the use of foot controllers in crane cabs. In view of the multiplicity of controllers in a modern crane, inclusion of foot operation would lead to greater ease of operation and more positive control. An experimental four-start type of master controller fitted with an adjustable pedal has been fitted into an adjustable mounting in front of a crane seat. Tests are in progress to find the most efficient siting and design of the pedal.

Machinery Trades Dinner

OVER 200 members and guests with their ladies attended the annual dinner-dance of the Association of Electrical Machinery Trades held on 19th November at the Savoy Hotel, London. Speeches were confined to the toast to the guests, proposed by Mr. C. E. Collins, chairman of the Association, and the response by Mr. D. D. Walker, M.A., M.I.E.E., chairman of B.E.A.M.A.

Mr. Collins in welcoming the guests particularly mentioned the presence of Mr. A. F. Plummer (president of the E.C.A.) and Mrs. Plummer and Mr. L. C. Penwill, C.B.E. (director and secretary, E.C.A.) and Mrs. Penwill, and expressed the pleasure of the members of the Association in having the ladies (whose evening it was) with them.

Mr. Walker, in responding, said that the manufacturers of electrical plant depended to a great extent on the Association's members. The worst advertisement for any manufacturer was to have his plant lying idle because of failure, so that the quicker and more efficiently the members of the Association did their job of repair, the better it was for the manufacturers.

A lot was being said about the practice of groups of manufacturers getting together and fixing the level of prices. It was a widespread practice and was not confined to certain groups in the electrical industry. There was a great cry for free competition and accusing fingers were pointed at those who agreed not to cut each other's throats. It was said that this was not in the public interest. There were many ways in which manufacturers could compete and price was only one; another was quality. Any interference with trade practices which would force manufacturers to regard quality as secondary to price would have untold consequences on our export trade.

Mr. J. T. Morgan, secretary of the A.E.M.T., made an appeal for the E.I.B.A. in his usual genial manner, and over £70 was collected for a number of valuable prizes which were distributed. During the evening there was an excellent cabaret.

An Early Electrified Farm

Replacement of Original Plant After Sixty-Two Years

By E. C. CLAYDON, N.D.Agr.E.*

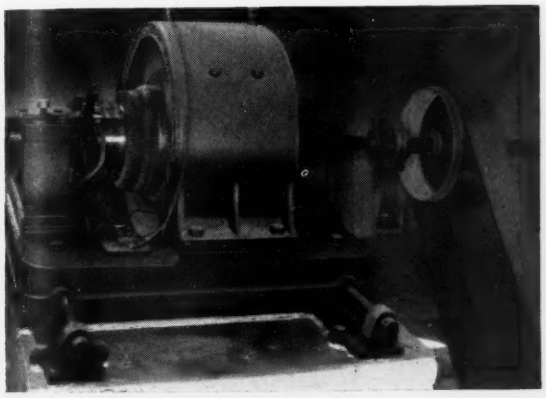
THE date when the first farm in England was electrified is probably a matter for conjecture, but the installation at Cheveney Farm, Yalding, Kent, which was put in commission in 1892 and is only at the present moment being replaced by a supply from the South Eastern Electricity Board must surely be one of the earliest.

The original installation consisted of a Stevens & Barker (now Tilling-Stevens) 110 V generator driven by a water wheel taking its supply from the river Beult. In 1906 the water wheel was replaced by a turbine as the head of water was found to be insufficient for the wheel to provide adequate power. The electricity supply was taken to Cheveney Farm from the riverside generator house by underground cable, the internal installation being carried out by means of galvanized grip conduit for lighting and power. Some of the original carbon filament lamps of a very early type are still in use as is the 5 h.p. electric motor for driving a root cutter and corn crusher through countershafting.

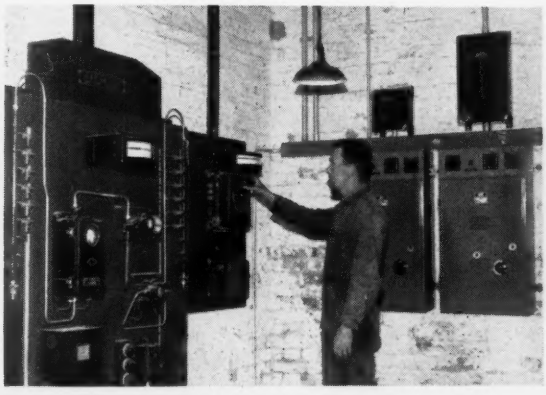
An interesting memento of the installation is in the form of a silver mounted, ivory paper knife suitably inscribed which was presented by B. Verity & Son (predecessors of the present Veritys, Ltd.) to Mrs. Alexander on 28th December, 1892.

There is little doubt that the installation could have carried on for many more years had it not been for the fact that the present owner of the farm, Air Vice-Marshal A. E. Borton, wished to install cold storage equipment for his apples. This installation rendered the provision of an adequate a.c. supply essential and accordingly the farm is now supplied by means of a 50 kVA pole mounted transformer from Seeboard's distribution system. Two 35 ton stores have been built in former hop kilns and it is the intention eventually to extend the installation considerably. The water driven generator will continue to provide electricity for a few local lighting circuits so long as it can be run economically.

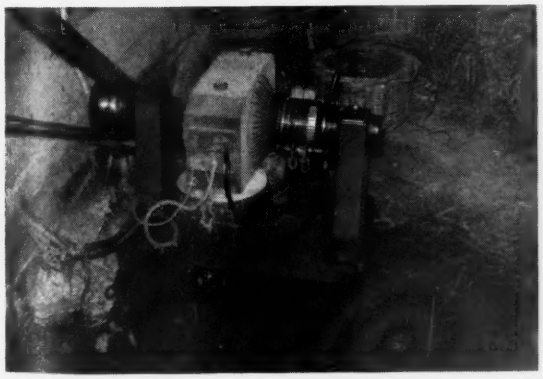
* Agricultural engineer, South Eastern Electricity Board, East Sussex and South West Kent Sub-Area.

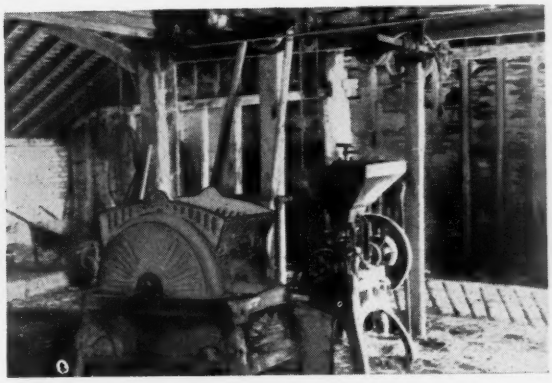


110 V generator installed at Cheveney Farm, Yalding, in 1892



Control panel of the fruit cold storage installation





The original 5 h.p. motor still used for driving the root cutter and corn crusher shown on the right

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Transport in Greater London

AN announcement appeared in your issue of 5th November that borough councils were at last bestirring themselves to prevent the withdrawal of the trolley-buses in the London Transport Executive area. This news was very pleasing to the long-suffering public, who have long realized that with the disappearance of the trolley-buses from the streets of the metropolis all hope of cheap fares and convenient travel will have gone for ever.

With the taking over by the London Transport Executive from the London Passenger Transport Board, all travelling facilities have steadily deteriorated. Before the war the L.P.T.B. had made great improvements to the whole transport system of London. Trolley-buses had taken the place of tramways north of the Thames and in Kent, Surrey and South-West London, and it was planned to extend these routes and convert the remainder of the L.C.C. tramways. Had this scheme been completed during the post-war years, London would to-day have the best electric street passenger service in Europe.

The oil-bus service which has replaced the last of the trams goes from bad to worse and for this we have to pay ever increasing fares. In North London and Middlesex plans were made and much work was completed towards the electrification of existing steam-operated railways; work was also undertaken on the extension of the Underground railway to Elstree. In the belief that the North London electrification scheme would be completed, many people purchased houses or land and they have been let down.

In spite of all the money, labour, time and material expended on the electrification of these lines, and this work was almost complete, the L.T.E. has made no attempt to finish this splendid scheme, and has informed the public that it has no intention of doing so. Further, the L.T.E. has withdrawn the steam train service that was working on these lines.

When the tramways were owned by the L.C.C. and other municipalities the public could make themselves heard through their elected representatives. To-day the public have no redress and no voice in the framing of policy. This Society has submitted a scheme to the Minister of Transport whereby the L.T.E. would be abolished; the Underground railway system worked by British Railways; and the surface transport controlled by the county councils. Through-running could be arranged with the trolley-buses as was worked in tramway days.

*Earlsfield, S.W.*18. H. S. TRINDER,
Hon. Treasurer,
London and Home Counties Electric Traction Society.

Storage Space Heating

I PERSONALLY know of two schools in the Birmingham area equipped with " Calidec " electric floor warming. At Hallfield School, Edgbaston, Birmingham, six classrooms, each 12ft 9in by 17ft by 9ft (height) are kept comfortably warm at a cost of 1s a day for each classroom during the months of October and November. The maximum cost is 2s a day per classroom during very cold weather.

Each room is loaded to 3·2 kW (all in the floor) and by using electricity only at night advantage is taken of the cheap " off-peak " tariff given by the Electricity Board. A mid-day boost of two hours is available if so desired in very cold weather.

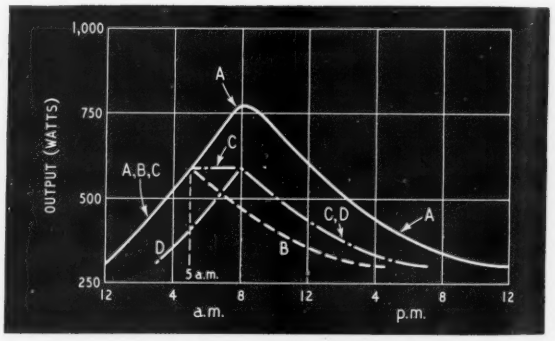
The loading in the schools is well below the 3·55 W/cu ft mentioned by Mr. Gill in your 22nd October issue and there is certainly no question of having to install oil storage or any other supplementary heating.

Solihull, Warwicks. ARTHUR GOODMAN.

THE following comments on Mr. Wheeler's letter in your issue of 5th November may be of interest.

The contribution of mean radiant temperature of the walls (T_r) to the comfort of a room is combined with that of air temperature (T_a) to give equivalent temperature (T_e), related in Bedford's formula by $T_e = 0{\cdot}522\ T_a + 0{\cdot}478\ T_r - 0{\cdot}01474\sqrt{v}.(100 - T_a)$, where v = air velocity in ft/min.

Even when an adequate load is installed, in a building of average construction the temperature of the walls and that of the air will drop 2 or 3 deg F during the working day with constant outside temperature, so that if comfort conditions are to exist throughout the day, it will be necessary to start at a higher temperature with consequent increase in energy consumed. In the case of buildings of light construction with the only appreciable thermal capacity in the floor, the temperature drop will be much more serious, yet representatives of both leading manufacturers have recommended this form of heating for aluminium buildings in all seriousness.



Output curves for 1·5 kW heater

My point about installing adequate load is best illustrated by an example based on the performance of an actual heater. Consider a building with a rate of heat loss of 1·5 kW at the design temperatures. According to Mr. Walton's article and Mr. Wheeler's letter, the recommended installed load would be a 1·5 kW heater. The performance of this heater compared with design conditions is shown in curve A. The daily heat losses are 36 kWh, yet the input is only 12 kWh and the maximum output rate of the heater is 0·77 W. Where does the heat come from to replenish that extracted from the walls during a two or three day cold spell, when a brick wall can only store 7 Wh per cubic foot per 1 deg F?

Thermostatic control as detailed by Mr. Wheeler is shown in curve B. In such a case with the charge ceasing entirely at 5 a.m., the temperature drop at the end of the working day would be 3 to 4 deg F. Some improvement can be made by continuing the charge under thermostatic control as shown in curve C, at the expense of extra energy.

Curve D shows a more economical method of thermostatic control from the running point of view, but it requires combined time clock and thermostat control.

If the outside temperature drops after the charge is terminated, the final internal temperature drops also. As this is a possibility, a further increase in initial internal temperature is required to guarantee comfort at the end of the day.

Temperature recordings, as offered by Mr. Wheeler, would be very interesting, provided they were accompanied by full data relating to construction, design temperatures and ventilation, details of other heat producing equipment and a guarantee that the design ventilation rate was maintained during the cold spell.

RONALD CROFT, B.SC., A.M.I.E.E.

Gourock, Renfrews.

I HAVE read the correspondence on storage radiators with much interest and some amusement. I agree wholeheartedly with Mr. Hazel that in theory a non-storage radiator used for intermittent heating will require less current than a storage radiator and, of course, an electric heater with, so to speak, no storage capacity will consequently use less current than an oil filled radiator. One is, however, faced with the difficulty that results seem to show that storage radiators use no more current than non-storage and consequently in the absence of some simple explanation the theory must be wrong.

I am, however, very reluctant to believe that the accepted principles of heat transfer and so on are wrong or to accept that the heat given out by a storage radiator differs either in its proportions of radiant and convected heat or in any other way from the heat given out by a comparable surface at the same temperature.

I believe that the question can be more simply explained. Heating is very far from being an exact science and in all heating experiments and investigations outside the laboratory at least the potential experimental errors are very large indeed. Within limits one is likely to obtain almost any desired result from any one not very closely controlled experiment. The variable factors of heat given off by the occupants, sunshine, wind direction and velocity, and moisture content of the outside air, and in addition the impossibility of accurately measuring the true mean temperature of the building all play an important part. When one adds to this the fact that the average temperature difference between outside and inside during the heating season is only in the neighbourhood of 20 deg F it is easy to see that any consumption figure is liable to have a margin of error of possibly $\pm$ 20 per cent.

This very vexed question will never be settled by an isolated experiment but it can, and I hope will, be settled when there is a reasonable amount of information available on the actual consumptions of electricity for buildings heated with both storage and non-storage heaters, in each case, of course, the consumption being related to the calculated heat loss of the building.

It should be pointed out that the whole idea of using storage heating is to obtain a cheaper off-peak tariff so that even if the consumption of electricity with a storage system is in excess of that with non-storage heating the running cost may still be smaller.

London, W.C.2. E. M. ACKERY.

Wind-Pump Conversion

IN the 5th November issue of the *Electrical Review* (page 718) we notice an illustration of a water pumping windmill of our manufacture which has been converted to electric drive. While the farmer mentioned may have improved his water supply by the substitution, doubtless some factor in this particular installation was responsible for the decision to change the method of driving the pump.

Naturally we have nothing against the foregoing but do take exception to the general remarks in the paragraph in the text matter which imply that all farmers owning windmills can improve their supply by substituting electric drive and can similarly benefit in respect of a more adequate and cheaper water supply. Such implications are both misleading and incorrect.

As makers of both electrically and wind driven pumps for use on farms, etc., we have no doubt a windmill can and does provide an ample supply of water at considerably less cost than a motor driven pump—even after allowing for the difference in capital costs. This fact is evidenced by the hundreds of successful installations operating to-day in Britain and a total supply of some 40,000 units, numbers of which have been in continuous operation for 30/40 years.

Worcester. THOMAS & SON (WORCESTER), LTD.
G. LAN,
Sales Manager.

Consumers' Deposits

"REFLECTOR" was surprised (*Electrical Review*, 19th November) at a suggestion that an Electricity Board should require a deposit. Two months ago the London Electricity Board demanded a deposit of £5 from me before they would supply business premises which I was about to lease. "Reflector" rightly comments that nobody likes this idea, and I am not an exception. Therefore, I asked the Board why they adopted this attitude, which was not usual in commerce. They said that the demand for a deposit was customary where the consumer was unknown to the Board.

I replied that I was not unknown in the industry, which I have served faithfully for over thirty years, but was told that unless I was known personally to someone in the London Electricity Board, the deposit must be paid. Although I have been paying electricity accounts to another Area Board, and to borough councils, for over thirty years without default, as they have not before been paid to the London Electricity Board, the deposit is required.

I suggested reference to the Area Board who had previously supplied me. This was nothing to do with the London Electricity Board, I was told. I offered references from well known electrical companies. These would not be accepted, they said, and neither would a banker's reference. Mention of my all-electric home, supplied by another Sub-Area of the London Electricity Board without a deposit, brought forth the information that deposits are required only from business consumers, and not from domestic consumers.

It was suggested that it was only reasonable that I should pay a deposit because I should receive three months' credit. However, another nationalized industry gives me six months' credit for my telephone account, which is ten times as great as my electricity account, and no deposit is required. Two lengthy telephone conversations failed to disturb this section of the London Electricity Board at all. I think that this autocratic attitude does no good to our industry, and I do not think it can create goodwill for the London Electricity Board, to whom I have sent a copy of this letter.

London, S.W.10. LESLIE MAYNARD.

Irish Electrical Pioneers

AS the theme of his chairman's address to the Irish Branch of the Institution of Electrical Engineers, Mr. R. A. Cuffe (Electricity Supply Board, Dublin) took "Some Irish Contemporaries of Faraday." In his introduction, summarizing the contributions to electrical knowledge by the earliest investigators in all countries, he mentioned that Robert Boyle (Earl of Cork), discoverer of Boyle's Law, published in 1675 an account of his "Experiments and Notes about the Mechanical Origins or Production of Electricity," said to be the first book on this subject in the English language.

Some ten months after Faraday had, in September, 1831, discovered electro-magnetic induction he received a letter signed "P.M." which described an experiment in which for the first time chemical decomposition was obtained by induced magneto-electric currents. The machine by which this was done (a model of which was shown by Mr. Cuffe on a slide) with its rotary motion and helical armature was claimed to be the world's first dynamo and its inventor to be the first thus to establish the identity of galvanic (voltaic cell) and magneto-electric currents. The importance of P.M.'s work has been brought out in the "Origin of Dynamo Machines" by Dr. Otto Mahr (Berlin, 1941). The identity of "P.M." (who wrote from Dublin) remained concealed, but evidence collected by the Rev. Dr. McLaughlin and published in 1948 indicated that the initials were probably those of a Dr. Patrick John Murphy.

Another notable inventor was Dr. N. J. Callan (then Professor of Mathematics and Natural Philosophy at Maynooth College), whose remarkable work in the eighteen-thirties included means of increasing the "intensity" of currents by successively making and interrupting the circuit to a large electro-magnet (induction coil) and said to be the first use of separate primary and secondary windings, having conductors of different cross-sectional areas and number of turns (transformer), on a common iron core. He was also referred to by Mahr as giving the first report of a self-excited dynamo, which he had made.

Finally there was J. W. McGauley, of Dublin, who in 1835 showed an electro-magnetic motor to the British Association.

The account of the activities of these men was given against a background of contemporary discoveries and inventions by others in the same field.

Hall Effect in Semi-Conductors

IN a paper given at the Measurements Section of the Institution of Electrical Engineers on 23rd November, Professor H. E. M. Barlow (University College, London) discussed a new application of the Hall effect in a semi-conductor, like germanium, to the measurement of power in an electromagnetic field. Semi-conductors, he said, showed a relatively large Hall effect, which occurred when a transverse magnetic field was applied to a conductor carrying a longitudinal current, setting up an e.m.f. in it at right angles to the magnetic field and to the current, thus producing a sideways deflection of the mobile carriers taking part in the conduction process. Semi-conductors generally contained both negative and positive carriers, represented respectively by excess elections and holes. The mean value, in time, of the Hall effect gave a direct measure of power in both steady and alternating fields.

The most serious limiting factor was residual rectifier action, which could best be mitigated by strengthening the magnetic flux and reducing the electric field. At low frequencies, using high permeability materials, the practicability of the method had been established. At high frequencies the application had been demonstrated qualitatively but a practical instrument had not yet been designed. Possibly a wattmeter calibrated at 50 c/s could be used at the very high frequencies at which power became one of the most significant quantities in electrical measurement. Examples were given of instruments from direct-current and low frequency types to arrangements suitable for 300 Mc/s, over which range the Hall effect remained at approximately the same value in regard to *n*-type germanium.

Calcium Carbide Production

THE discussion of the paper by Mr. C. J. Beavis on the use of electricity in the production of calcium carbide which was presented before the Utilization Section of the Institution of Electrical Engineers and summarized in the *Electrical Review* last week was opened by Colonel W. E. Dennis (The Distillers Co.), who enquired about any effects on the transformers from surges on the 132 kV line. He expressed surprise that copper tubes were not used instead of 24 by $\frac{5}{16}$ in copper for the busbars of the transformers feeding the electrodes, as in Germany. He considered the author's use of low voltage transformers at 50 V with centre tap was sound.

Mr. T. B. Rolls (McLellan & Partners) questioned whether the furnace described as a submerged arc furnace should not be called a resistance furnace. Its control seemed to be entirely by voltage, whereas in the normal arc furnace used for steel production reactance was important. Presumably only one of the 2 MVA units was used at a time; otherwise the possible fault current on the 415 V system would be very large.

Mr. E. Robertson (English Electric Co.) pointed out that the plant was rushed into production early in the war when supplies of carbide from Norway were cut off.

Mr. W. P. Warren (South Wales Electricity Board) observed that the system load factor in the area already exceeded 60 per cent. The whole installation had an average power factor of between 0·85 and 0·88. At 55 MW this meant lagging kVA of 32 MW. With so high a load factor the more accurate and expensive automatic control of power factor obtainable with rotary correction might not be justified. With static correction the capital charges, maintenance and running losses would be lower, but switching at high voltages might be difficult.

Mr. A. J. Dawson agreed with the author's description of an arc zone and a resistance zone, and enquired what percentage of total furnace energy appeared in the arc zone. In his own experience of submerged arc furnaces for phosphorous manufacture, a secondary current showed third harmonic values of about 8 per cent and fifth harmonic values of about 0·5 per cent. Possibly the carbide furnace had lower percentages. He thought the removal of electrode stumps from a white hot furnace must present a difficult problem. He wondered whether the economies that might result from closed carbide furnaces of saving in heat and in gas collection, which could be used for the purpose of drying raw materials, would justify the worry of taking out even more electrodes.

Mr. E. W. Rodnight (British Oxygen Co., Ltd.) emphasized that power cost was an extremely large proportion of the overall cost of producing carbide. He asked whether a radically different electrical design for a new furnace would be considered.

Mr. Leslie Smith said that short circuits in the early days of the equipment were initiated by surges on the primary side of the furnace transformers, probably due to 33 kV switching, and transferred to the low voltage side. Various steps had been taken to limit the surge voltages that appeared on the 220 V busbars to less than the flash-over value.

Mr. J. Vaughan Harries enquired whether, since the substation was situated on sand hills near the sea, salt spray or dust from the sand hills introduced any hazards.

Mr. T. B. Rolls observed that there had been considerable trouble with deposits on the insulators, but they were due to the carbide works and not to the sand dunes.

VIEWS on the NEWS

By REFLECTOR

AN unusual accident resulting in the death of a man in the cowhouse of a farm in Montgomeryshire illustrates the impossibility of guarding against all contingencies. In this case a lamp on the end of a flexible had been smashed and the remains and the holder were resting in a box of nails on a metal brooder. When the victim of the accident put his hand into the box he received a fatal shock. A subsequent examination by an Electricity Board man disclosed that the switch controlling the lamp was in the neutral wire. The cardboard of the box was sufficient to insulate the lamp from the metal brooder which otherwise would have passed the current to earth. The installation had not been tested by the Electricity Board, nor was there any guard on the lamp. The employment of unguarded lamps on the end of flexible leads is a too-common practice against which consumers should be constantly warned.

* * *

At Kilkee (co. Clare) there is great indignation because the Irish Electricity Supply Board inflicts a standing charge of 3s per room in this summer resort. Members of the local Council threaten to revert to candles and lamps if something is not done. Things seem pretty bad for one councillor has said, according to the *Sunday Chronicle* (Irish edition):—

> "During the tourist rush houseowners in Kilkee slaved night and day to enable the Electricity Supply Board's unjust charges to eat up their profits in the off-season. . . . We will make the E.S.B. see the light. We will not surrender even if the fight lasts 10 years."

* * *

Complaining about the "unauthorized activities of half-baked wiremen and amateur electricians," whose work is a source of danger to life and property, the *Indian Electrical Contractor and Trader* says that the inroads of these people have created a shortage of work for licensed electrical contractors. After calling for action by the authorities and supply undertakings the paper says:—

> "The consumer requires to be told a bit sternly that if any unauthorized work or extension is detected he will not only forfeit the right to use electric energy, but a punishment commensurate with the guilt will be meted out to him."

It would seem that to make the punishment fit the crime anything short of electrocution would be inadequate. But this might happen without detection.

* * *

A correspondent has asked the Editors what they know about Stephen Grey, the subject of a threnody by Dr. Samuel Johnson who called him "The Author of the Present Doctrine of Electricity" and wrote:—

> "No more shall art thy dext'rous hand require
> To break the sleep of elemental fire;
> To rouse the pow'rs that actuate Nature's frame,
> The momentaneous shock, th' electrick flame."

A little research reveals that Grey was the first to divide materials into "electrics" and "non-electrics" according to their excitation or non-excitation by friction. His experiments before the Royal Society in 1731 were said to have shown "the facility with which electricity passes through great lengths of conductors and are remarkable for having been the first of this nature." Grey was elected a fellow of the Royal Society in 1732–3; he had previously been awarded the Copley Medal on two occasions. He died in 1735–6.

* * *

Reviewing the 1953–54 report of the British Electricity Authority, the *Electrical World* says:—

> "The British without regard for financial costs do nearly everything by electricity—even to heating houses with resistance coil 'fires.' Government policy which equalizes all 'fuel' prices—gas, coal, electricity—is probably responsible."

This rather suggests that this country is practically all-electric, although we have not reached this desirable state yet. I do not know how Government policy has equalized fuel prices—if it has!

* * *

Some years back there appeared on the market a gas-operated radio set. It incorporated a device for producing small currents from thermocouples heated by gas jets. Such a remarkable invention was hardly likely to catch on and after the first mention of it I never heard any more about it. Now I read in *Indian Trade and Industry* that a similar device to operate radio sets with kerosene has been developed by the Research Division of All-India Radio.

> "It has been estimated that the operating cost will be three rupees a month for about three hours of daily listening. This is considerably cheaper than battery operation. Also, dry-battery radio sets can be worked straight off the new device."

I would still prefer the more expensive dry batteries—at least they have no odour and are much safer.

* * *

Seventy years ago (22nd November, 1884) the *Electrical Review* reported an interview by Mr. Joseph Chamberlain, the President of the Board of Trade, of a deputation, including R. E. Crompton, Robert Hammond and Emil Garcke, which pointed out the difficulties of working under the 1882 Electric Lighting Act. The deputation's particular concern was with Section 27, which provided that electricity undertakings could be acquired by local authorities after twenty-one years. Objections were also made to the compulsory laying of mains and the provision that supplies must be given through a meter.

In his reply Mr. Chamberlain said that he could not agree to the repeal of Section 27 but promised to consider the modification of its terms. (In point of fact the section was repealed by the 1888 Act which extended the purchase-option period to forty-two years.) It may be of interest to quote one passage of Mr. Chamberlain's reply:—

> "A committee of the House of Commons was appointed for considering the whole matter. . . . The intention of the committee undoubtedly was to prevent the creation of those vast monopolies which in the case of gas and water had sprung up in a way that was felt to be inconsistent with the true advantage of the community."

Since then we have had the 1947 Act.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

The Telegraph Construction & Maintenance Co., Ltd., announces that the deputy chairman, **Mr. J. N. Dean,** has been appointed chairman. **Lord Colgrain** becomes a director to fill the vacancy caused by the recent death of his father. The appointment of the present Lord Colgrain, who is chairman of Grindlays Bank, Ltd., will preserve the family connection with Telcon which was started when his great uncle joined the board when the company was incorporated in 1864.

Mr. J. N. Dean

Mr. Dean entered the company's service in 1922 as a research assistant with the Gutta Percha Co., and later became chief chemist to the Telegraph Construction & Maintenance Co., Ltd. After becoming technical manager, he was, in 1945, appointed technical director of that company and a director of its associated company, Submarine Cables, Ltd., of which he is now chairman and managing director. In 1946 he was appointed to the board of Telcon as executive director and in 1950 succeeded the late Sir Geoffrey Clarke as managing director. In February of this year he became deputy chairman. On the invention of polythene just before the war, Mr. Dean recognized this new plastic as a cable insulant of importance, and proceeded to apply it to the manufacture of cables for radar equipment. He was also the first to apply it to the manufacture of submarine communication cables.

At a meeting of the board of the Electric Construction Co., Ltd., held at Bushbury Engineering Works, Wolverhampton, on 17th November, the directors appointed **Mr. J. C. Milne,** M.I.E.E., M. Amer. I.E.E. (technical director), as managing director in succession to the late Mr. W. M. B. Furniss. Mr. Milne, who had his early training with the Hackbridge-Hewittic Companies and the London Electric Railways, joined the Electric Construction Co. more than twenty years ago as rectifier engineer, successively holding appointments as chief rectifier engineer, switchgear and rectifier manager, assistant general manager, and technical director.

Mr. J. C. Milne

Mr. J. Buck, A.M.I.E.E., has been appointed deputy power station superintendent at Stella South power station, North Eastern Division, B.E.A. He received his technical education at Rutherford and Darlington Technical Colleges and served his apprenticeship with the London and North Eastern Railway. Mr. Buck joined the North Eastern Electric Supply Co., Ltd., in 1939 and served in substations in the Tyneside area. He moved to North Tees "A" and "B" power stations in 1940 and later held appointments at Horden power station and in the Economy Section at Carliol House, Newcastle. On vesting day he was a shift charge engineer at North Tees "A" and "B" power stations and was appointed operating and efficiency engineer at the same station in 1951 after brief periods at Middlesbrough and Scarborough stations. Subsequently he was appointed deputy power station superintendent at Carville power station, which post he held until going to Stella South.

Mr. J. Buck

Mr. C. Donaldson

Mr. R. Lott

Mr. G. Street

Mr. C. Donaldson has been appointed deputy power station superintendent at Stella North power station. He served his apprenticeship with C. A. Parsons & Co., Ltd. and after a short period with the company as outside erector, served with various shipowners as a sea-going engineer. He commenced in the electricity supply industry at Dunston in 1932 and subsequently became station superintendent at Dunston "A" and "B" and Blaydon power stations, which post he held until his present appointment.

Mr. R. Lott, A.M.I.E.E., A.M.Inst.F., has been appointed deputy power station superintendent at Dunston "A" and "B" and Blaydon power stations. Mr. Lott served a general engineering apprenticeship with the South Wales Electric Power Co. from 1937 to 1941. Later he was transferred to Llynfi power station as assistant combustion and efficiency engineer and was subsequently appointed combustion and efficiency engineer. In 1948 he was appointed second assistant engineer generation (operation) with the South East Scotland Division of the B.E.A. and later was promoted to senior assistant engineer.

Mr. G. Street, formerly acting power station superintendent at Scarborough, has been appointed deputy power station superintendent at Carville power station. Mr. Street, who received his early technical training at Chesterfield Technical College, served an apprenticeship in electrical engineering with the Clay Cross Coal & Iron Co., Chesterfield, eventually being placed in charge of the electrical plant at its Buxton Lime Works. He was appointed assistant shift charge engineer at Scarborough power station in 1947, became shift charge engineer in 1949 and in 1952 was appointed acting station superintendent.

Mr. G. W. Moore, Associate I.E.E., has been appointed electrical engineer to the Iraqi Government and left London this week to take up his new post. Mr. Moore was educated at Barry Secondary School and Moorland School, Cardiff, and at Cardiff Technical College and University. He received his practical training as a pupil apprentice with John Williams & Sons, and the Globe Foundry & Engineering Co., Ltd., Cardiff. In 1930 he was appointed assistant electrical engineer during the construction and rebuilding of steelworks operated by Guest, Keen

Mr. G. W. Moore

& Baldwins Iron & Steel Co., Ltd., and was responsible, in conjunction with the English Electric Co., Ltd., for the steam power station and other electrical plant. He became assistant district engineer with the Mid-Southern Utility Co., Ltd., Aldershot, in 1932 and in 1937 was appointed consumers' engineer with the West Cambrian Power Co., Ltd. During the last war he was engaged as an electrical engineer in the Admiralty. From 1945 to 1947 Mr. Moore was section engineer with the London and South East England Area of the Central Electricity Board, after which he was appointed electrical engineer with the Anglo-Iranian Oil Co., Ltd., and later with the Kellogg International Corporation in London.

General Sir William D. Morgan, G.C.B., D.S.O., M.C., chairman of Siemens Brothers & Co., Ltd., and **Mr. John Innes,** C.B., director of the Telegraph Construction & Maintenance Co., Ltd., have been appointed directors of Submarine Cables, Ltd. After a distinguished military career, General Sir William Morgan was appointed a director of Siemens Bros. in 1951, and chairman in 1953. Mr. Innes was formerly managing director of Cable & Wireless, Ltd., which post he retained until 1950 when he joined the board of Telcon.

Mr. C. K. Turner-Hughes, A.F.R.Ae.S., has been appointed commercial manager of the Aircraft Electrical Division of the Plessey Co., Ltd. Mr. Turner-Hughes is well known in the aircraft industry, having been chief test pilot with Sir W. G. Armstrong-Whitworth & Co., Ltd., for over fourteen years. For the past seven and a half years he has been export manager of Harry Ferguson, Ltd., now Massey-Harris-Ferguson, Ltd.

Mr.C.K.Turner-Hughes

Mr. F. H. McCrea has been elected chairman of the Dubilier Condenser Co. (1925), Ltd., and will continue as managing director. He recently completed twenty-five years' service with the company.

Mr. J. R. Mackay has been appointed deputy managing director of Richardsons, Westgarth & Co., Ltd., with effect from 1st January next.

Sir John Dalton, chairman of W. T. Henley's Telegraph Works Co., Ltd., left for Australia on Tuesday last. He is visiting the company's branches in Sydney, Melbourne and Brisbane.

At a meeting of the London County Council held on 16th November **Mr. F. A. Rayfield,** M.I.C.E., M.I.Mun.E., M.Inst.R.E., the senior divisional engineer in the Chief Engineer's Department, was appointed deputy chief engineer in succession to Mr. Forbes Jackson, whose retirement we reported in our last issue. The salary is £2,550 rising to £3,050.

At the annual general meeting of the Electrical Trades' Commercial Travellers' Association on 19th November **Mr. Arthur T. Haywood** was elected president and **Mr. J. H. Bowen,** chairman. Mr. Haywood, who is a director of Electrical Components, Ltd., and other companies, has been vice-president of the Midland Branch of the E.T.C.T.A. since its inception and is well known for his work in connection with the E.I.B.A. in that area. Mr. Bowen was for many years associated with Siemens Electric Lamps & Supplies, Ltd., before becoming a director of John Bowen Fittings, Ltd. A luncheon was given by Mr. Bowen in honour of Mr. Haywood and of Mr. T. B. O. Kerr, the retiring president.

Mr. A. T. Haywood

Mr. J. H. Bowen

At the annual meeting the following allocations were announced:—Royal Commercial Travellers' Schools, £52 10s.; I.E.E. Benevolent Fund, £5 5s.; Commercial Travellers' Benevolent Institution, £2 2s.; Electrical Industries Benevolent Association, £350.

The following appointments have been made by the Metropolitan-Vickers Electrical Co., Ltd.:—**Mr. J. V. Bigg,** M.A., A.M.I.Mech.E., as assistant chief engineer, Condenser Engineering Department; **Mr. J. A. Walker,** Associate M.C.T., M.I.E.E., as assistant manager, Sheffield Office; and **Mr. K. Greenwood,** B.Sc.(Eng.), Graduate I.E.E., as district engineer, Erection Department, Glasgow.

Mr. Bigg joined Metropolitan-Vickers in 1939 as a college apprentice, having received his technical education at Clare College, Cambridge. From 1943 he served with the Royal Electrical and Mechanical Engineers, attaining the rank of major. In 1946 he rejoined the company in the Condenser Engineering Department.

Mr. Walker received his technical education at the College of Technology, Manchester, and joined the company as a school apprentice in 1919 after serving as a lieutenant in the Royal Engineers. After his training he was employed in the Motor Sales Department and the Control Sales Department before being appointed to the Sheffield office staff. He was chairman of the Sheffield Sub-Centre of the I.E.E. in 1947 and is now the hon. secretary.

Mr. Greenwood was educated at St. Peter's School, York, and joined the company as a school apprentice in 1939. In 1942 he obtained the London University external degree of B.Sc.(Eng.), with first-class honours, from Salford Royal Technical College. On completion of his training he joined the staff of the Erection Department.

Mr. J. V. Bigg

Mr. J. A. Walker

Mr. K. Greenwood

The Southern Division of the British Electricity Authority has appointed **Mr. A. D. Matthews,** A.M.I.E.E., as station superintendent of the Marchwood (Hants) power station.

Mr. A. D. Matthews

Mr. Matthews has been station superintendent of Portsmouth generating station since September, 1948. A native of Portsmouth, he attended Portsmouth Grammar School and Portsmouth Technical College and later was apprenticed in turn to the Lancashire Dynamo & Motor Co. and the British Thomson-Houston Co., Ltd. He was at Portsmouth generating station from 1930 to 1939 in several appointments and then served with the Royal Engineers and Royal Artillery from 1939 to 1945, attaining the rank of major.

After war service Mr. Matthews returned to Portsmouth as maintenance engineer before going to Belfast in 1947 as assistant superintendent at the Harbour power station. In 1948 he went to Longford generating station as assistant station superintendent, remaining there until his appointment to the position he now relinquishes.

Mr. R. H. Patman, M.I.R.T.E., A.I.M.I., Associate I.E.E., transport and stores officer of the South Eastern Electricity Board, presented a paper

entitled "An Approach to the Organization and Operation of a Large Composite Fleet" at a meeting of the Institute of Road Transport Engineers on 18th November, at the Royal Society of Arts, London. Transport officers from several other Electricity Boards were in the audience and at the conclusion of the meeting the chairman of the Council, Mr. J. W. Hedges, presented Mr. Patman with the Institute's diploma, which is only the sixth awarded since 1950.

Mr. S. A. H. Robinson is to be in charge of the new branch office recently opened by John Thompson, Ltd., at "Ravenswood," Westfield Lane, Ryton-on-Tyne. Mr. Robinson joined the John Thompson Group early in 1937 and has since then been associated both with the works in Wolverhampton and the London office.

Mr. Cyril Darby, press officer of the Central Office of Information regional headquarters in Bristol, has been appointed information officer to the Eastern Electricity Board.

The Minister of Fuel and Power has appointed **Sir Arthur Howard,** K.B.E., C.V.O., D.L., J.P., of Steyning, Sussex, to be a part-time member of the South Eastern Electricity Board, from 1st January next.

Alderman J. P. D. Lacey, O.B.E., J.P., of Milton, Portsmouth, has been reappointed as a part-time member of the Southern Electricity Board. **Major H. Richardson,** O.B.E., M.C., T.D., J.P., M.I.E.E., M.I.Mech.E., F.R.S.E., of London, will retire from the Board on 31st December next on completion of his term of office.

This year's dinner and dance of the Southern England staff of **British Insulated Callender's Cables, Ltd.,** and its associated company the B.I.C. Construction Co., Ltd., was held at the Royal Festival Hall, London, on 12th November. It was the first time that the Festival Hall had been chosen for this annual event and over 1,100 employees were present. Dinner was presided over by Mr. H. J. Stone, director and deputy chief executive of British Insulated Callender's Cables, Ltd., who presented a model of the "Skylon," made of icing sugar, to Mr. C. O. Boyse, director and general manager of the B.I.C. Construction Co., Ltd., which was responsible for erecting the "Skylon" for the 1951 Festival of Britain. A similar function for the northern staffs had been held in the Casino, Blackpool, a few weeks earlier, when 650 employees attended. Mr. W. H. McFadzean, chairman of both British Insulated Callender's Cables and the B.I.C. Construction Co., presided.

Mr. H. J. Stone, director and deputy chief executive of British Insulated Callender's Cables, Ltd., speaking during the presentation of an icing sugar model of the "Skylon" to Mr. C. O. Boyse, director and general manager of B.I.C. Construction Co. Mr. Boyse is seated on the right of the photograph

Mr. H. G. Meads has been appointed a director of Hoover, Ltd., and made comptroller of the company's financial and administrative services. Mr. Meads relinquishes the position of secretary and **Mr. H. D. Vigers** has been appointed secretary of the company in his place.

Mr. H. Foster-Smith, M.C., M.I.E.E., has been appointed by the United Nations Technical Assistance Administration as expert in the management and maintenance of electrical plant to the Venezuelan Government. He has been associated with the construction of steam and hydro-electric plants in South America and was for some years general manager and chief engineer to electricity supply companies in Brazil and Colombia. At the time of the appointment he was regional officer in charge of the Birmingham Region of the British Electricity Authority's production inspection and test section. He saw active service with the Royal Engineers and was awarded the M.C. for his work on bridging. He received his early training at Birmingham University and with Belliss & Morcom, Ltd.

The Dramatic Section of **Johnson & Phillips Sports Club** recently presented "Count Your Blessings," by Ronald Jeans, on 11th, 12th and 13th November in the company's main canteen at Charlton. The leading parts were well played by Stanley Lund, Mrs. Edna Whithard and Gay Butterworth, and they were supported by Patricia James, Francis Doody, Douglas Moth, Jose Sanders, Edward O'Neil, Anne Baker and Joyce Burls.

On 5th November the directors of **Solenoids & Regulators, Ltd.,** Birmingham, invited all their employees, together with families and friends, to a "bonfire party." The invitation was accepted by nearly 100 people who, after light refreshments had been served at the company's works, enjoyed an excellent fireworks display. The bonfire was lit by Mr. G. A. Yarwood, A.M.I.E.E., the founder of the company.

Colleagues of the late Mr. L. Wall, who was for many years secretary of the Birmingham Branch of the Electrical Industries Benevolent Association, have set up the **Leslie Wall Memorial Fund** and have collected £220 as a donation to the E.I.B.A.

OBITUARY

Mr. J. Harwood Lumsden, who retired as No. 7 Sub-Area manager of the North Western Electricity Board in July, 1951, died on 11th November at the age of sixty-eight. Mr. Harwood Lumsden was appointed Sub-Area manager on vesting day after having been, since 1929, chief engineer and manager to the Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board. He was educated at the North Eastern County School, Barnard Castle, received his training at the Technical College, Sunderland, and he served an apprenticeship with Richardsons, Westgarth & Co., Ltd., Sunderland. In 1908 he was appointed junior charge engineer to the National Electric Supply Co. at Preston. This was followed by four years' marine experience, and three years with the British Thomson-Houston Co., Ltd. Later he was appointed boiler house superintendent of the Shropshire, Worcestershire & Staffordshire Electric Power Co. and, in 1919, he was appointed generation engineer to the Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board.

Mr. Christopher McCready, who for thirty-four years until his retirement in 1946, was on the staff of the Traction Department of the British Thomson-Houston Co., Ltd., Rugby, died at Littlehampton on 11th November at the age of seventy-three. Born in Dublin, Mr. McCready joined the B.T.H. Co. as a traction engineer in 1912. He received his early scholastic training in Dublin and at Monkton Combe School in Bath and later returned to Ireland to study at the Royal College of Science, Dublin. After completing his training in 1901, Mr. McCready joined the Great Northern Railway of Ireland and was appointed chief assistant electrical engineer. During the 1914-18 war Mr. McCready served in the Royal Naval Volunteer Reserve and held the rank of lieutenant upon demobilization in 1919. A memorial service was held at Littlehampton on 18th November.

Mr. C. L. E. Stewart.—The death occurred on 17th November, at Exeter, of Mr. Charles Lionel Ernest Stewart, M.I.E.E., at the age of seventy-six. Mr. Stewart was educated at Finsbury College, London, and received his training with Johnson & Phillips, Ltd. He was a shift charge engineer at Liverpool from 1898 to 1900 and then became chief assistant electrical engineer at Rochdale. In 1909 he was appointed borough electrical engineer and tramway manager at Rawtenstall, a position which he held for twenty-two years. Since 1931 he had acted as a consultant and adviser to a

number of electricity supply undertakings, textile mills, etc. Cremation took place at Weymouth last Saturday.

Mr. J. H. Wears, O.B.E., who during the war was responsible for the production of thousands of tanks at the Stafford works of the English Electric Co., Ltd., has died at Hythe, Kent, aged seventy-five. Mr. Wears joined the company in 1928 as superintendent of the Switchgear Department and in 1934 was appointed chief superintendent, Stafford Works.

Dr. J. B. Whitehead.—The death is reported from New York of Dr. John Boswell Whitehead, a founder of the School of Engineering at the Johns Hopkins University and Professor Emeritus of Electrical Engineering of the University. He was eighty-two.

WILLS

Mr. F. S. Prentice, managing director of F. S. Prentice & Co., electrical contracting engineers, who died on 14th January last, left £4,475 gross (£4,413 net).

Mr. J. S. Mitchell, former commercial manager, A. C. Cossor, Ltd., who died on 4th August, left £10,943 gross (£4,019 net).

Mr. J. W. T. Roffey, area manager of Sangamo Weston, Ltd., who died on 13th May last, intestate, left £4,857 gross (£4,121 net).

Mr. J. Mirrey, retired manager of the drawing office, A. Reyrolle & Co., Ltd., who died on 26th June, left £17,691 gross (£17,493 net).

Mr. J. W. Treece, managing director of Electrical Vehicle Services, Ltd., and Treece (Birmingham), Ltd., who died on 7th May, left £34,790 gross (£27,492 net).

Mr. E. F. Bacon, retired district manager in No. 2 Sub-Area, Yorkshire Electricity Board, and former chief electrical engineer to the United Premier Oil combine, who died on 3rd August, left £3,065 gross (£2,817 net).

Mr. S. Widdowson, for many years labour manager for the General Electric Co., Ltd., Witton, who died on 16th June, left £3,295 gross (£1,497 net).

Mr. M. Solomon, former director of the General Electric Co., Ltd., Pirelli-General Cable Works, Ltd., etc., who died on 1st September, left £56,929 gross (£56,385 net).

The Hon. James Russell Rea, secretary and legal adviser to the British Electrical and Allied Manufacturers' Association, 1936–51, who died on 15th August, left £258 gross (£69 net).

Mr. F. M. Colebrook, senior principal scientific officer, National Physical Laboratory, who died on 21st June, left £5,452 gross (£5,366 net).

Mr. J. H. Hollows, of Lytham St. Annes, retired electrical storeroom manager, who died on 15th September, left £6,278 gross (£6,218 net).

Mr. F. W. Beales, district senior clerk to Edmonton Electricity Board, who died on 30th August, left £6,357 gross (£6,188 net).

Major General Sir Frederick Hugh Sykes, a director of the Atlas Electric & General Trust, Ltd., who died on 30th September, left £76,877 gross (£73,184 net).

Parliamentary Report

IN the House of Lords last week Lord Calverley asked the Government whether the £750,000 granted to the Independent Television Authority was a gift or a loan; the I.T.A. was to have the use of plant and aerials belonging to the B.B.C.; if so, at which B.B.C. stations and under what conditions; if it was a fact that the Authority could not give viewers a provincial service until 1956; and if he would state what was the cost of television licences in the United States.

Earl De La Warr, Postmaster General, replied that there was no gift or loan of £750,000 to the Authority. Under Section 11 of the Television Act a sum, within a maximum of £750,000 might, subject to the approval of Parliament, be granted each year to the Authority. It was expected that arrangements for sharing plant and masts at the transmitting stations would be made where this was technically possible. For technical reasons the conditions might not be uniform at the first three stations, London, Birmingham and South Lancashire, but these were matters for settlement directly between the B.B.C. and the Authority. It was too early to fix firm dates, but the Authority hoped to begin broadcasting from the Birmingham and South Lancashire stations by late 1955. In the United States, television services were financed by advertisements and there was no system of viewers' licences comparable to that in the United Kingdom.

Cables over Railways

In the House of Commons, Commander Maitland asked the Minister of Transport and Civil Aviation if he would give a general direction to the British Transport Commission to expedite the procedure for granting permission for high-voltage electric cables to cross railway tracks whenever so requested.

Mr. Boyd-Carpenter replied that this was a matter of day-to-day management for the British Transport Commission. He had no reason to believe that there was generally any avoidable delay.

Railway Electrification Schemes

Mr. Ernest Davies asked the Minister of Transport and Civil Aviation what schemes of railway electrification were at present being undertaken; and what were being planned in detail for commencement shortly.

Mr. Boyd-Carpenter said that the electrification of the Shenfield–Chelmsford and the Shenfield–Southend lines and the extension of the Manchester–Sheffield electrification scheme to Rotherwood Marshalling Yard was proceeding. Detailed planning for electrification of the London–Tilbury line was in hand and some preliminary engineering works had been started. As he informed the House on 3rd November, the Commission hoped to present a plan for re-equipment and modernization of British Railways, including further electrification schemes, before the year ended.

Broadcasting in Wales

Mr. Watkins asked the Assistant Postmaster General whether the proposed v.h.f. station at Wenvoe or the proposed station near Aberystwyth would be sufficiently powerful to enable listeners in mid-Wales to receive the Welsh Service.

Mr. Gammans said that these stations should give a much better service in the southern and western parts of mid-Wales, but in the central part reception would vary because of the mountainous nature of the country. The P.M.G. was awaiting a further report from the Television Advisory Committee on the development of the Corporation's v.h.f. plan. Subject to its views, he proposed to give early authority for extension of the first stage of that plan (which included Aberystwyth) to cover Wenvoe.

Engineers and Management

ENGINEERS in the electricity supply industry should not become engrossed in the technical side of their work to the exclusion of the administrative and managerial aspects of their job, was the advice given to members of the Electrical Power Engineers' Association (West of England Branch) when they met for their annual dinner at Bristol on 20th November.

The president, Mr. E. Hanson, said it was time a halt was called to the practice of people other than engineers gaining administrative positions in the industry. Until recently, he said, top-class managers were engineers, but now "we seem to have an influx of people who come in not at the lower levels but at the top." It seemed now that the engineer was so busy with purely technical engineering problems that he allowed administrative problems and appointments to slip through his fingers.

Proposing the toast of "The Association," Mr. A. N. Irens, chief electrical engineer of the Bristol Aeroplane Co., said that too many engineers were absorbed by the technical aspects of their work and paid insufficient attention to the wider problems of management and administration. Undue preference was being shown in industry and public utility companies for lawyers and economists and those dealing more with "written work" than with technical problems.

ELECTRICITY INQUIRY

THE Committee of Inquiry into the electricity supply industry in England and Wales (under the chairmanship of Sir Edwin Herbert) is inviting bodies having a special interest in the organization of the industry to submit evidence. Since it was set up the Committee has been examining evidence relating to consumer interests. A number of bodies have now been invited to give evidence on the organization and general efficiency of the industry and the Committee asks for representations from any person or body with a specific interest in or knowledge of the organization of the industry. Evidence, accompanied by any recommendation for improved organization, should be submitted before the end of the year to the Secretary, Committee of Inquiry into the Electricity Supply Industry, Ministry of Fuel and Power, Thames House South, Millbank, London, S.W.1.

Evidence on the organization of the industry has been sought from the Federation of British Industries, the Trades Union Congress, the Council for Wales and Monmouthshire, the Amalgamated Engineering Union, the Electrical Trades Union and other unions, the Electrical Power Engineers' Association, the Association of Managerial Electrical Executive, the British Electrical and Allied Manufacturers' Association, the Cable Makers' Association, and the Electrical Contractors' Association.

In written evidence submitted to the Committee the Federation of British Industries deals with the question of industrial tariffs.

The Federation considers that the general structure is satisfactory in most cases but there are anomalies arising from differences in practice between Area Boards. One of these Boards, for example, will not employ a monthly basis for its m.d. charge; two others employ a kW basis instead of the kVA basis generally preferred; two others base their charges for the small consumer on floor area, which bears no relation to consumption; some Boards do not permit the integration of individual readings where a supply enters a factory at different points; and others are no longer offering such facilities for supplies to separate factories or parts of factories belonging to the same concern and situated close together.

It is considered that, as a general principle, tariffs for different classes of consumers should be related as closely as possible to the actual cost of giving the supply. An annual basis of maximum demand should be available to continuous process and other special industries where demands do not vary appreciably throughout the year.

Attention is drawn to the growing practice of Area Boards to require industrial consumers to take supplies at high voltage and make substantial contributions towards the capital cost of the necessary equipment.

The Federation criticizes the consumer - representation system and suggests an independent arbitration tribunal, to which consumers could appeal, and a National Consultative Council.

TECHNICAL STAFF SALARIES

NEW salary schedules were approved by the National Joint Board for the Electricity Supply Industry on 16th November to take effect from 1st July last. In general the structure of the main schedule is retained although the former four highest classes (K to N) have been adjusted and reduced to three, Class N disappearing.

Then Grade 1 is omitted from Classes F to M as those formerly in this section are now dealt with as " managerial electrical executive " under separate arrangements. In the old schedule the initial schedule salaries were for the first two years with an increase in the third year and another after the fourth year. The new schedule provides for three annual increments after the first year. Also the figures have been regularized in a series of steps so that the salary for a particular grade in any class is one step lower than the next, going from A to M.

The general effect is to give a minimum increase of £55, a maximum of £180 and an average of £86 for the 12,000 men concerned. The top salary is now £1,750. The separate schedules for headquarters staffs and engineering draughtsmen have also been revised.

In commenting on the new schedule the *Electrical Power Engineer* (the journal of the Electrical Power Engineers' Association) expresses the disappointment of the " rank and file " at the increases conceded, saying that the Association's National Executive Council accepted them only because it recognized that there was no real alternative in present circumstances.

The view of the *Electrical Power Engineer* is that the increases are merely " an instalment on account of a moral and practical debt owed by the industry to the technical staff on which it depends for its progress." There was a strong minority view in the National Executive Council, which is probably shared by a large proportion of members, that there should be a return to the " shock tactics " which attracted so much attention earlier this year when notice was given to terminate the National Joint Board Agreement. This would have involved the taking of a strike ballot but " counsels of moderation and social responsibility have for the moment carried the day."

It is recognized that the new schedule has good features—the extension of " differentials," the raising of the minimum salary and a more logical shape.

U.S. MOTOR MARKET

A REPORT prepared by the Commercial Department of the British Embassy, Washington, D.C., for the Board of Trade on the United States market for electric motors, indicates a rapidly growing demand for British motors. The United Kingdom was the chief foreign source of supply in 1953, imports being valued at $838,532, more than double the value of imports from Canada ($359,717), the second largest foreign source of supply. There is every indication that the present heavy demand for electric motors for domestic appliances will continue, and it would appear that there are excellent opportunities for United Kingdom concerns providing the requirements of the United States market as regards styling, availability of parts and servicing facilities, and the need for quick deliveries are studied. Past experience indicates that United Kingdom integral h.p. motors can usually be offered on the United States market at competitive prices, although it may be more difficult to price f.h.p. motors at figures attractive to United States purchasers. It is recommended that any United Kingdom concern contemplating a considerable volume of business in the United States should first send a representative to conduct a personal survey, and it should also consider the establishment of a subsidiary company in the United States.

Electric motors should conform to specifications of the National Electrical Manufacturers' Association (N.E.M.A.). Considerable modifications in N.E.M.A standards have recently been made and American makers are in course of bringing them into effect. Principal emphasis in the revised standards is on smaller frame size, substantial weight reductions having been effected.

PRICES OF MATERIALS

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM Ingots	ton £156 0s 0d
COPPER, H.C. Electro	ton £274 0s 0d
Fire Refined 99·70%	ton £273 0s 0d
Fire Refined 99·50%	ton £272 0s 0d
COPPER Tubes ..	lb 2s 8½d
Sheet	ton £340 15s 0d
H.C. wire and strip ..	ton £313 15s 0d
LEAD, English ..	ton £107 10s 0d
Foreign	ton £106 0s 0d
MERCURY	flask £110 0s 0d
TIN, block (English) ..	ton £720 0s 0d
ZINC, G.O.B. Foreign	ton £81 5s 0d
Electrolytic	ton £85 10s 0d
BRASS Tubes (solid drawn)	lb 2s 2d
Sheet	ton £273 5s 0d
Wire	lb 2s 9½d
PHOSPHOR BRONZE Wire	lb 4s 1½d
PLATINUM	oz £30 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 25d–25½d

NEW ELECTRICAL EQUIPMENT

Precision Potentiometers

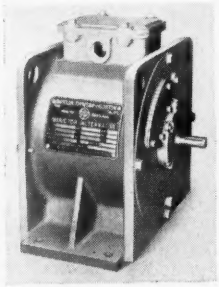
Two new precision potentiometers have been brought out by SALFORD ELECTRICAL INSTRUMENTS, LTD., Peel Works, Silk Street, Salford, 3, Lancs. They comprise linear miniature and sub-miniature types, and have been developed for use where space is particularly limited.

The miniature potentiometer, the D.2, weighs 15 grammes, is 1⅛in in diameter, covers a resistance range from 1,000 to 90 000 ohms and has a power rating of 1 W. The maximum resolution obtained is 6 turns/deg and the standard electrical angle is 340 deg. There are two taps on the standard model, each being made to a single turn of wire, and up to three units can be ganged on a single shaft.

The type S.D. sub-miniature potentiometer weighs 4 gm and measures ⅝in in diameter by ½in long excluding terminal and spindle projections. The resistance range covered is from 200 to 8,000 ohms. The maximum resolution is 2 turns/deg and the power rating ½ W. There are two taps and the electrical angle is 280 deg. The sub-miniature potentiometer cannot be ganged, and is essentially a "trimmer" and unsuitable for servo application, but it can be supplied with a ½in long shaft or with a screw adjustment as required.

High Frequency Alternator

A small homopolar high frequency inductor alternator (the subject of a British Patent application) in which the excitation is provided by an annular permanent-magnet of "Alcomax III" instead of a d.c. field winding supplied from an external source has recently been developed by the BRITISH THOMSON-HOUSTON CO., LTD., Rugby. The machine is completely self-contained and apart from a saving in cost in not having to provide a separate supply for excitation, it makes for greater reliability as the output is independent of any other supply.

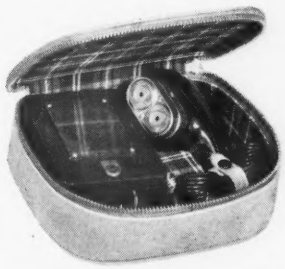


B.T.H. high frequency alternator

The machines at present being built have a continuous output rating of 250 VA, 115 V, 1,600 c/s, at 2,400 r.p.m. They are totally enclosed, watertight up to the shaft level, and are fully shockproof. However, one of these machines of a physical size comparable with that of a ventilated enclosure would be capable of outputs of up to 1 kVA.

Battery Dry Shaver

PHILIPS ELECTRICAL, LTD., Century House, Shaftesbury Avenue, W.C.2, announce the introduction of a new model of their "Philishave" dry shaver which can be run off a 4½ V battery. The three 1½ V torch batteries are housed in a steel case on the outside of which is fitted a mirror. The batteries are claimed to provide about 200 minutes' shaving time—which represents approximately forty shaves.



"Philishave" battery dry shaver

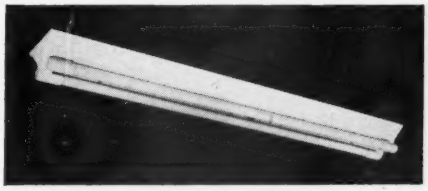
The appliance incorporates the "Bi-Ax" shaving head and is powered by a 4½ V d.c. motor. The shaver, lead, plug, battery case and cleaning brush are finished in a maroon shade and the whole is packed in a neat carrying case which is fitted with a zip fastener.

By means of a cigarette lighter adaptor, which can be purchased as an accessory (price 10s 2d), the shaver can be operated by a 6 V or 12 V car battery. The retail price of the shaver is £8 3s 1d plus £1 14s 11d purchase tax in the United Kingdom.

Twin-lamp "Seagull" Fitting

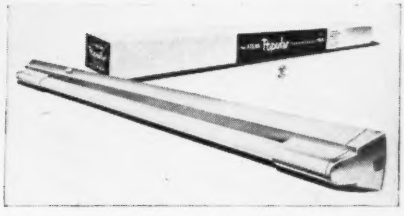
A twin-lamp design of the Mazda "Seagull" 5ft fluorescent fitting is now available from the BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, London, W.C.2.

Constructed in sheet steel and stove enamelled white, the "Seagull" fitting consists of a lamp auxiliary gear tray enclosed by a V-shaped distributive reflector channel. Auxiliary gear includes a B.T.H. "brick" type ballast and "Permitol" capacitor. It also incorporates the "Pendicone" suspension system for rapid installation and fixed lampholders. The retail price is £13 11s 4d.



Twin-lamp Mazda "Seagull" fluorescent fitting

Right: Atlas "Popular Pack" fluorescent lighting unit



Automatic Iron

The latest addition to the range of electric irons manufactured by LINCASS ELECTRIC, LTD., White Hart Yard, Guildford Street, Chertsey, Surrey, is the 444P "Heavy" iron. The "easigrip" streamlined Bakelite handle has left and right handed thumb rests and the low-angle bevel of the chromium sole-plate is designed to slip easily under buttons and folds. The weight of the iron is 6 lb and the heat selector dial can also be supplied with Spanish or French wording. Loading is 750 W and models are available for all a.c. voltage ranges.

Lincass 444P "Heavy" electric iron

Price of the all chrome model is £2 2s. Model 434P with chromium sole-plate and coloured enamel top costs £2 1s.

Fluorescent Unit

A 5ft fluorescent "Popular Pack" announced by THORN ELECTRICAL INDUSTRIES, LTD., 105–109, Judd Street, London, W.C.1, contains a sturdily built batten fitting complete with all the necessary control gear and an Atlas 80 W "White" tube.

The batten fitting, which is built of sheet steel with aluminium diecast end-caps and finished in white stove enamel, has been designed for ease of installation, a special anchor-plate enabling it to be flush-mounted to any ceiling point. Safety chains support the weight of the equipment whilst it is being fixed and connected up. Built-in control gear consists of a varnish-impregnated slim section choke, tapped for 200/250 a.c. The starter switch is of the new miniature universal two-pin pattern and is provided with ceramic radio interference suppressors.

The new fitting will not be sold separately from the "Popular Pack" and it is not intended that it should compete with the normal range of "Atlas" lighting fittings. The retail price is £4 19s 6d, which includes 2s 2½d purchase tax on the lamp.

OVERSEAS ELECTRICAL TRADE

Effect of the Dock Strike on Exports

DESPITE the dock strike exports of electrical machinery and apparatus last month at £12,630,478 were still slightly above the previous month's total. They were, however, just over a million pounds less than in the corresponding month of last year. The cumulative total for the first ten months of the year, £142,065,787, exceeds by £1·3 million that for the corresponding period of last year.

Details of the values of exports of individual products are given in Table I, an analysis of distribution being found in Table II. Of the £2,532,513 worth of generating equipment and motors sent abroad in October the largest shares went to South Africa (£426,419), Australia (£375,867), New Zealand (£308,203) and Canada (£204,525). South Africa (£437,565) was also the biggest buyer of convertors, rectifiers, transformers and switchgear.

In the valve, radio, television, radar and sound reproducing apparatus market particularly good results were achieved in several European countries, including France (£187,722), Holland (£155,735) and Norway (£103,160). Canada too was among the biggest buyers, taking £182,810 worth of equipment. South Africa (£165,558) and Australia (£110,757) were the best markets for telegraph and telephone equipment. India (£252,126) took about one-fifth of the total exports of cables and wires.

Apart from the items covered in our tables a number of other electrical products are classified separately in the official returns. These include washing machines not exceeding 150 lb weight, the October exports of which were valued at £185,728, making £2,491,430 (£2,210,758) for the first ten months of the year; ditto, over 150 lb weight £152,957, making £1,297,101 (£885,153); washing machine parts £34,366, making £508,735 (£348,200); electric conduit tubes and cased tubes £64,863, making £680,798 (£782,294); welding electrodes, ferrous £66,868, making £681,318 (£825,273); ditto, non-ferrous £25,647, making £222,068 (£321,189); and electric locomotives £21,730, making £1,701,129 (£3,233,698).

Holland, the United States and Western Germany supplied respectively £385,798, £205,105 and £184,375 of the £1,262,900 worth of electrical machinery and apparatus imported in October. Principal items were communication equipment (£451,998) and valves (£142,745). For the first ten months of the year the total imports increased from £7,829,807 to £13,097,520.

TABLE I.—ELECTRICAL EXPORTS

Class	Oct., 1954	Ten months ended 31st Oct.	
		1953	1954
	£	£	£
Generating sets and generators:			
Diesel-driven, up to 10 kW	103,296	832,178	1,003,275
Ditto, 10 to 65 kW	106,656	1,440,969	1,534,224
Ditto, 65 to 200 kW	50,238	882,169	816,817
Ditto, over 200 kW	259,199	1,440,597	3,347,055
Spark ignition engine driven	10,011	255,794	164,829
Steam turbine driven	135,437	1,755,629	783,564
Other prime mover driven	18,374	433,633	803,065
Generators	199,316	2,385,195	1,992,920
Parts of generators	746,361	4,757,733	4,309,824
Motors, complete, other than railway, tramway and trolley-bus:			
Up to ½ h.p.	150,521	1,247,514	1,767,999
Over ½ h.p. but under 1 h.p.	60,807	344,371	508,308
1 h.p. to 250 h.p.	332,905	3,901,177	3,829,372
Over 250 h.p.	106,249	759,152	1,258,404
Railway, tramway and trolley-bus motors complete and parts of all motors	73,418	1,747,807	1,332,488
Motor starting and controlling gear	174,825	2,304,729	1,915,453
Converting machinery	45,460	397,247	293,554
Mercury-arc rectifiers	42,652	508,272	488,287
Transformers for lighting, heating and power (incl. coils)	624,758	9,999,553	9,447,574
Switchgear and switchboards (not telegraph or telephone)	1,207,882	13,299,392	12,856,332
Primary batteries:			
Lighting	57,828	578,487	661,669
Radio	141,438	855,062	1,467,332
Other	39,795	430,128	449,007
Parts (excl. carbons)	42,649	236,885	509,981
Lamps:			
Filament, exceeding 24 V	65,449	650,425	753,604
Ditto, under 24 V	29,243	215,234	302,454
Discharge lamps, fluorescent tubes, etc.	43,946	422,286	583,069
Other lamps	10,306	144,639	224,093
Radio and television, etc, apparatus:			
Cathode-ray tubes	11,491	139,329	111,369
Other valves (not X-ray)	138,256	1,672,840	1,620,567
Radio and television transmitters	94,955	769,948	595,079
Commercial radio and radar equipment	938,175	7,835,018	10,146,682
Domestic radio receivers, mains	109,670	1,941,630	1,584,693
Ditto, battery	17,715	458,936	527,475
Ditto, other (incl. car)	7,407	133,076	131,044
Radiograms	30,652	417,840	364,153
Television sets	56,310	281,516	306,245
Public address equipment	61,584	481,653	587,811
Sound reproducing app., n.e.s.	17,359	146,762	229,938
Components and parts, n.e.s., incl. parts of valves and c.r. tubes	556,354	4,287,974	5,540,532
Telegraph and telephone installations	473,151	4,251,603	5,626,233
Telephone instruments, separately consigned	80,949	1,492,695	1,037,599
Telegraph and telephone parts	389,897	6,151,264	4,530,667
Line apparatus for long distance commun.	73,951	1,832,376	1,332,443
Cookers	77,700	446,198	782,821
Toasters	27,030	165,478	201,418
Other cooking apparatus	34,091	201,394	343,522
Parts and accessories	63,127	279,616	440,693
Space heating appliances	26,422	189,321	328,186
Water heating appliances	25,710	245,707	246,423
Other heating appliances	20,735	245,301	315,214
Parts and accessories	55,457	427,900	483,190
Irons	55,111	519,788	598,036
Arc welding equipment, a.c.	21,507	451,524	328,741
Ditto, d.c.	9,789	383,718	445,204
Resistance welding equipment	7,431	110,987	159,382
Magnetos, ignition	6,175	201,527	142,522
Sparking plugs	133,326	1,152,392	1,426,700
Elec. appliances for aeroplanes, n.e.s.	128,994	1,592,703	1,790,704
Ditto, for motor vehicles, n.e.s.	241,900	1,730,380	2,382,419
Ditto, for cycles, n.e.s.	36,891	641,854	755,824
Signalling app. (incl. traffic signals)	23,347	655,507	503,914
Industrial radio-frequency equipment	23,453	132,762	217,750
Bell app. (not telegraphic or telephonic)	8,212	72,800	82,427
Instruments, commercial	135,525	1,388,501	1,464,435
House service meters (not prepayment)	99,205	786,012	1,155,348
Ditto, prepayment	13,487	90,897	144,909
Electro-medical apparatus (not X-ray)	35,319	367,387	436,207
X-ray apparatus (excl. tubes and valves)	36,320	587,462	479,384
Vacuum tubes	11,013	207,379	179,782
Desk fans	19,711	296,288	323,575
Ceiling fans	67,337	937,393	908,089
Vacuum cleaners	125,276	1,247,721	1,688,362
Floor polishers	66,706	594,239	1,000,048
Food mixers	44,314	414,705	486,001
Hair clippers and dry shavers	143,934	413,856	942,069
Other portable appliances	38,615	174,221	275,787
Parts	64,224	430,050	723,703
Portable elec. tools (not saws) and parts	155,048	1,378,308	1,566,676
Cables and wires:			
Telegraph and telephone, submarine	60,040	852,717	658,227
Ditto, other	216,451	6,615,488	3,155,835
Cotton, silk or art. silk insulated	26,518	566,181	360,638
Enamel, glass or asbestos insulated	78,227	849,001	710,635
Paper insulated	416,257	9,164,590	5,081,803
Rubber insulated	304,011	4,196,340	3,891,550
Other	180,913	2,680,067	2,268,973
Accumulators for motor vehicles	132,305	1,405,716	1,535,690
Ditto, traction	24,195	177,571	241,680
Ditto, radio and other portable	72,382	433,965	397,969
Ditto, other	37,096	482,917	519,976
Parts and accessories	66,017	455,320	599,268
Elec. porcelain, etc. (incl. insulators)	73,612	801,847	817,375
Insulating cloth and tape	49,523	423,465	494,269
Other insulating material	78,920	608,177	733,079
Permanent magnets	35,554	305,953	392,191
Radio, telegraph and telephone testing equipment, n.e.s.	47,351	266,319	316,788
Scientific elec. instruments (not telegraphic or telephonic)	184,083	1,468,185	2,110,236
Electrical machinery, n.e.s.	62,306	784,165	1,299,040
Electrical apparatus and appliances, n.e.s.	460,330	5,457,708	5,049,017
TOTAL	12,630,478	141,682,685	142,065,787

TABLE II.—DISTRIBUTION OF ELECTRICAL MACHINERY, APPARATUS AND APPLIANCES

Country	Oct., 1954	Ten months ended 31st Oct.	
		1953	1954
	£	£	£
Channel Islands	69,058	404,857	556,264
Gibraltar	4,497	167,783	90,866
Malta and Gozo	41,853	247,052	472,521
Cyprus	46,559	448,685	585,765
Sierra Leone	7,023	319,342	233,022
Gold Coast	82,188	990,254	1,087,142
Nigeria	162,452	1,887,623	1,533,176
Union of South Africa	1,487,015	16,879,482	15,217,663
Northern Rhodesia	102,296	1,182,739	1,190,955
Southern Rhodesia	213,948	2,148,072	2,009,801
Tanganyika	17,256	512,428	564,571
Kenya	136,229	2,224,063	1,425,540
Uganda	49,295	745,881	578,171
Nyasaland	4,488	119,124	93,631
Mauritius	6,797	248,758	191,477
Aden	32,522	1,502,956	754,991
Bahrain, Qatar and Trucial Oman	54,703	879,950	1,097,411
Kuwait	26,622	1,371,777	1,130,216
India	1,071,047	15,420,195	12,895,449
Pakistan	302,213	2,057,180	4,430,044
Singapore	230,134	2,502,033	2,620,760
Federation of Malaya	148,570	2,520,328	2,144,265
Ceylon	61,217	1,506,171	1,138,437
British North Borneo	25,973	318,663	363,440
Hong Kong	113,691	1,804,726	1,523,897
Australia	1,355,897	14,418,646	14,486,674
New Zealand	895,154	7,534,002	8,217,221
Canada	807,596	7,305,855	6,294,922
Jamaica	16,806	601,917	587,356
Barbados	11,068	130,051	195,092
Trinidad	54,093	697,845	776,868
British Guiana	18,487	282,438	332,768
Anglo-Egyptian Sudan	73,208	991,069	938,275
Other Commonwealth countries	83,074	1,251,278	1,173,961
Irish Republic	277,129	2,824,997	2,696,135
Soviet Union	123,813	336,021	1,899,589
Finland	132,173	650,405	1,125,073
Sweden	314,168	3,250,059	3,470,703
Norway	397,473	2,461,710	2,650,844
Iceland	25,799	173,028	159,542
Denmark	113,092	1,071,902	1,625,481
Poland	3,229	905,465	551,223
Western Germany	119,020	781,097	1,204,797
Netherlands	413,697	4,099,325	5,166,177
Belgium	215,753	2,762,092	2,489,963
France	333,068	2,321,272	2,731,304
Switzerland	74,992	707,163	866,612
Portuga	78,975	1,281,852	1,830,499
Spain	117,524	2,523,830	2,379,711
Italy	131,543	1,820,150	2,208,010
Austria	24,246	494,906	548,792
Czechoslovakia	36	49,789	30,272
Yugoslavia	144,450	497,383	978,059
Greece	45,469	812,226	707,378
Roumania	1	1,075,841	14,943
Turkey	34,093	1,007,883	489,791
Netherlands Antilles	5,086	120,775	66,609
Belgian Congo	18,684	336,913	266,629
French Morocco	12,799	211,383	230,002
Angola	12,970	111,860	101,975
Portuguese East Africa	16,551	201,969	219,254
Syria	22,405	218,368	259,116
Lebanon	17,785	322,341	316,886
Israel	12,942	526,695	303,640
Jordan	10,093	246,602	193,010
Egypt	70,169	1,042,998	930,191
Libya	7,564	182,978	83,528
Saudi Arabia	21,541	425,352	509,514
Iraq	166,608	1,963,987	2,203,940
Iran	27 576	173,662	334,099
Burma	95,440	994,150	1,314,987
Thailand	125,538	1,304,199	1,621,198
Indonesia	49,808	696,896	430,498
Japan	95,605	618,104	654,393
United States of America	163,700	1,948,231	2,283,095
Cuba	9,308	169,654	170,328
Mexico	45,602	292,994	295,994
Colombia	136,708	496,662	902,810
Venezuela	213,153	1,503,004	1,547,555
Peru	21,202	360,608	301,701
Chile	59,471	364,349	301,532
Brazil	7,312	1,087,221	639,796
Uruguay	47,309	257,997	686,031
Argentine Republic	51,835	593,090	744,236
Other foreign countries	152,942	1,369,024	1,395,730
TOTAL	12,630,478	141,682,685	142,065,787

I.E.E. North Midland Centre

THE annual dinner of the North Midland Centre of the Institution of Electrical Engineers was held at the Queens Hotel, Leeds, last Friday. The toast to the Institution was proposed by Lieut.-Commander G. W. Wells, R.N. (Retd.), of Scunthorpe, who referred to the fact that unlike the pioneers of electrical development in the past, whose inventions were world famous, many of the present-day inventors could not hope to obtain individual publicity. The Institution during its 83 years' existence had increased its membership from 70 to 38,000, many of whom had important inventions to their credit. He considered one of their most important contributions to human welfare to be the great advances in ultra-violet ray therapy given to the medical profession.

Responding, Mr. J. Eccles, president of the Institution of Electrical Engineers and deputy chairman of the British Electricity Authority, said they could not restrict the free use of science, of skill and invention in any country in the world. There must be free play for all the improvements that scientific education and craftsmanship could produce. That was the kind of competition they had to face without protection of any kind. Leeds, as the centre of a great home and export industry, had experienced the cutting edge of world competition. The people of Leeds were well aware of the effect of lower standards of living and Government subsidies in other countries on their ability to compete in overseas markets.

Mr. Eccles said that everyone rejoiced that through the various agencies for improving world trade something was being done to discourage competitors from depressing the wages of their workers in order to promote unfair competition. The only way to meet such competition was to be equal to the best in craftsmanship, in scientific knowledge and in the energy with which to apply it. He referred to the dwindling of scientific instruction in school because of the shortage of science teachers. The truth was that the remuneration and prospects of trained scientists in the teaching profession were very much lower than they were in industry. To say that teaching was a vocation which was attractive in itself was ignoring the simple fact that most people, including teachers, required all that they earned to enable them these days to maintain a home and educate a family.

Mr. W. A. Crocker, chairman of the North Midland Centre of the Institution, referred to the large number of students who were specializing in electronics and the Deputy Lord Mayor of Leeds (Councillor Albert Smith) congratulated the Centre on the large amount of research and educational facilities it made available to its members.

The Inventor of the Valve

Coinciding with the Jubilee of the invention of the thermionic valve the Television Society has published a 134 page biography of Sir Ambrose Fleming whose original patent in 1904 gave rise to the science of electronics and radio communication. It has been written by his former student and assistant, Prof. J. T. MacGregor-Morris, with a foreword by Prof. E. W. Marchant and an appendix of personal recollections by Mr. Arthur Blok, O.B.E. The text is illustrated with many reproductions of original notes and letters, many of which are published for the first time.

The edition is limited to 1,000 copies and the book will thus not only be a unique record of Fleming's achievements but will increase in value as time goes on. Copies are obtainable from the Television Society, 164, Shaftesbury Avenue, London, W.C.2, price 10s post paid, or through any bookseller.

INDUSTRIAL NEWS

Non-Destructive Inspection

In view of the greatly increasing application of non-destructive testing in all branches of the engineering industries, a Society of Non-Destructive Inspection has been formed to assist persons responsible for the use of non-destructive examination methods. The main object of the Society is the interchange of information and experience between those concerned with the development, control, and use of non-destructive testing equipment and techniques. The Society is concerned with the promotion of radiographic, ultrasonic, magnetic, acoustic and other methods of non-destructive inspection. The headquarters are at Duncan House, Dolphin Square, London, S.W.1.

Gas Cleaning Plant for India

It is reported that Lodge-Cottrell, Ltd., has secured a contract valued at over £600,000 for electrostatic gas cleaning plant for new furnaces at the Indian Iron & Steel Co.'s works in Bengal. The contract was obtained in face of competition from Germany and the United States.

Paper Mill Plant

The General Electric Co., Ltd., has received a contract from Empire Paper Mills, Ltd. (an organization within the Reed Paper Group) for a 4,500 kW double pass-out geared turbo-alternator complete with condenser and feed heater, which will form part of a scheme for modernizing the power supplies of the Greenhithe paper mill. At the moment the mill operates on a 40 c/s supply. It is proposed to change this to 50 c/s and the new set will generate 3-phase current at 50 c/s, 3,000 V. The turbine will be supplied with steam at 600 lb/sq in and 800 deg F from a new oil fired boiler. Initially there may be up to 40,000 lb/hr of steam at 160 lb/sq in passed out from the new set to existing machines, which include a 2,500 kW G.E.C. pass-out turbo-alternator generating at 40 c/s and passing steam for process at 20 lb/sq in. During the period of frequency change-over both pressure controlled pass-out branches on the new set will be in operation at 160 lb/sq in and 20 lb/sq in. Ultimately, when all the load is converted to 50 c/s operation, the only demand on the new set for process steam will be for some 35,000 lb/hr at 20 lb/sq in for the paper machines. Provision will be made on the turbine shaft so that after the frequency conversion, the h.p. casing and necessary wheels may be altered so that the final machine will be of the single pass-out type to ensure maximum efficiency for the ultimate steam conditions. The condenser, single stage feed heater and the 300,000 lb/hr deaerator are being supplied by Hick, Hargreaves & Co., Ltd.

Nottingham Electric Club

This Club has arranged a varied programme for this session. In his presidential address Mr. F. N. Crabtree presented the results of some research into the origins of wholesaling. The Club, which is in its second year, has invited members of other local associations to attend the monthly lectures.

Transmitter for Belgium

A high-power (30 kW) h.f. communication transmitter type HS.51 has recently been shipped to Belgium from the Chelmsford works of Marconi's Wireless Telegraph Co., Ltd. This transmitter has been manufactured for the Belgian R.T. and T., and is to be installed by Marconi engineers at Ruisselede, Belgium. The contract was secured in face of intensive foreign competition, rival tenders having been submitted from the U.S.A., Germany, Holland and France. The transmitter is designed for the transmission of radio-telephonic or telegraphic communications over long distances and under conditions of heavy traffic.

Window Display Competition

Oldham (Lancs.) Service Centre in the No. 3 Sub-Area of the North Western Electricity Board has been nominated winner of the Board's seventh annual window display competition. By winning, Oldham has added to a long list of successes by the Board's No. 3 Sub-Area, which has won the competition outright on four occasions and shared it on one other with No. 2 Sub-Area in 1952. The winning window was dressed by Mr. W. Halliwell, the senior service centre assistant, and Mr. J. Gartside, a service centre assistant. Eighty service centres entered the competition. This year's theme was "Home Comforts." As in the past, displays had to be produced on a small budget and were first judged on a sub-area basis before final area judging by a panel comprising Board members, senior officers and outside specialists. Second place went to the Wigan Service Centre. Apart from this display and the winning one, the other Sub-Area winners were Urmston (No. 1 Sub-Area); Blackpool (No. 4 Sub-Area); Darwen (No. 5 Sub-Area); Whitehaven (No. 6 Sub-Area); and New Mills (No. 7 Sub-Area). In addition, five service centres, Eccles, Horwich, Whitefield, Padiham and Kendal, were commended.

The winning display by Oldham Service Centre in the N.W.E.B. window display competition

Engineers' Guild

The annual report of the Engineers' Guild for 1953–54 will be presented at the annual meeting to be held on 8th December. It refers to the election in June last of Mr. Bryan Donkin as president of the Guild for 1955. The membership of the Guild at 30th September was 4,228, as compared with 3,554 at the end of the previous year. At the request of members a sub-committee has been set up to investigate the status of professional engineers employed by the British Transport Commission. The Committee concluded that salary scales in the middle and upper ranges were abnormally low, and a case is being built up for submission to the Commission.

The Cuban Market

The predominance of United States goods in Cuba makes the sale of British domestic electrical appliances difficult, except for thermostatically controlled electric irons which are becoming more popular as their qualities become more widely known. In his report to the Board of Trade on the economic and commercial conditions in Cuba (H.M. Stationery Office, price 4s 6d, 4s 9d post free), Mr. P. S. Stevens, First Secretary (Commercial) to H.M. Embassy, Havana, says that British design is good and prices are competitive. Domestic electric refrigerators made in the United Kingdom are hardly known, and sales cannot be expected in great quantities because of the dominance of United States manufacturers. Electrical machinery imports from the United Kingdom were greater in 1953 than in either of the two previous years, and there was a substantial increase in the value of British prime movers imported.

Most of the electricity consumed in Cuba is at present generated by the Compañia Cubana de Electricidad. Consumption has risen from 585·7 million kWh in 1949 to 851·5 million in 1953. The company's 1951–55 construction programme throughout Cuba is costing $73 million and will increase generating capacity to 267,000 kW. A little more than half of this has so far been spent. Present capacity is 218,600 kW, including a new generating unit brought into commission early in 1954.

Graduates in Industry

The Federation of British Industries has published two complementary handbooks on the subject of graduates in industry. The first, "A Career for the Graduate in Industry," is addressed to the undergraduate, and is being distributed widely in universities and schools. Its purpose is to show that there is a wide variety of satisfying careers in industry, both for the science and the arts graduate.

Having explained in general terms what industry is, the booklet goes on to analyse its staff structure and to indicate the

scope it offers to the graduate, his role in the firm, prospects and salaries.

The second handbook, "Industry and the Graduate," is addressed to industry itself, and is being sent to the 6,800 member firms of the F.B.I. and its affiliated trade associations. It points out that in the long term there can be no greater contribution to increased industrial efficiency than the recruitment of young men with qualities of leadership who can develop into good managers. The booklet suggests how science and arts graduates can be employed to the best advantage, how they can be recruited, and how they should be treated during the sometimes difficult initial years.

The price of each of these handbooks is 2s, including postage, from the Federation of British Industries, 21, Tothill Street, London, S.W.1. An earlier handbook in the series, "Education and Training for Management," published last December, has been reprinted and is available at the same price.

Gauge and Tool Apprentice Training

The Gauge and Tool Makers' Association has published a survey of the methods of apprentice training adopted by concerns of all sizes in the gauge and tool making industry. Copies of the survey (1s each) can be obtained from the Association, Standbrook House, Old Bond Street, London, W.1.

Electrical Engineers' Exhibition

We regret that in last week's note on this exhibition the period was given as 18th–19th March; actually it will run from 15th to 19th March.

Philips Bristol Branch

The new showrooms and branch premises of Philips Electrical, Ltd., at 47–49, Victoria Street, Bristol, were officially opened on 12th November by Sir Gurney Braithwaite, Bt., M.P. for North West Bristol. The new premises replace those in Redcliffe Street which were destroyed by fire in February of this year. The present building, consisting of basement and three floors, has undergone extensive structural conversion and the interior has been completely redesigned in contemporary style. One novel feature of the planning is that each room in the building contains a different working application of the many types of lamps and lighting manufactured by the company. Comprehensive ranges of radio and television receivers, radiograms and record players and lamps and lighting are displayed in the showroom on the ground floor. Warehouse space has been extended and improved. The official opening, by Sir Gurney, took place in the presence of many distinguished representatives of the electrical and radio industries in the West Country. They were welcomed by Mr. G. Hofman (managing director), Mr. D. E. Beard (Bristol branch manager), and divisional heads of the company. Following the opening, a luncheon was held at the Grand Hotel, Bristol. The architect of the structural conversion of the new premises was Mr. de Metz, F.R.I.B.A. The building contractors were Stone & Co. (Bristol), Ltd., and the electrical installation was carried out by C. C. Shackelton, of Kingswood, Bristol.

Philips new showroom at Victoria Street, Bristol

Laurence, Scott Extensions

Extensions to the Instrument Department at the Thorpe Road, Norwich, works of Laurence, Scott & Electromotors, Ltd., were opened on 16th November by Rear-Admiral (E.) Sir Alexander D. McGlashan, K.B.E., C.B., D.S.O. (Deputy Director of Naval Ordnance) in the company of other sernior representatives of the Admiralty and other Service and Government Departments. The new building adds more than 60,000 sq ft to the Department and will be used mainly for the assembly of precision electro-mechanical instruments and allied equipment and for a cam and gear cutting section. In the course of his remarks at the opening, Sir Alexander referred to the long association between the Admiralty and the company, dating from the end of the last century, and Sir Hamish MacLaren, K.B.E., C.B., D.F.C. (Director of Electrical Engineering) paid tribute to the pioneering spirit of the company. The building was completed in less than a year by local contractors. Some small departments which stood on the site, such as a plating shop, have been transferred to the branch factory on the outskirts of Norwich. Space made available in the existing shops will be occupied by an extension of the machine shop and the re-organization which will be made possible will improve the production of industrial control gear.

Rear-Admiral Sir Alexander McGlashan (fifth from left) inspects an industrial type control board at the opening of Laurence, Scott & Electromotors extensions. In the centre is Mr. G. H. Wilson, chairman and managing director of the company

Change of Name

Electrical & Refrigeration Services, Ltd., Southfields, have changed their name to E.R.S. (London), Ltd.

Trade Announcements

Mr. D. MacMillan, previously a buyer with Wm. McGeoch & Co., has been appointed lamp and lighting salesman for the **British Thomson-Houston Co., Ltd.** in Glasgow. He will operate mainly in the Clyde area.

Walter Logan & Co., Ltd., have moved to 34, Oak Tree Drive, Totteridge, London, N.20 (telephone: Hillside 7319).

The London District office of the **Edison Swan Electric Co., Ltd.,** is moving to 10–12, Euston Buildings, N.W.1 (telephone: Euston 6072). The head office will remain at 155, Charing Cross Road, W.C.2. The effective dates of the move of the London district office are:—Trade counter for lamps, valves and cathode ray tubes, 22nd November; trade counter for all other products, 29th November: offices, 6th December.

Gent & Co., Ltd., have appointed Henry Tatton & Son, Ltd., 24–30, Rose Street (East), Hanover Street, Edinburgh, 2, as their agents for controlled electric clock systems, time recorders, programme instruments, etc. In addition to their Edinburgh premises Henry Tatton & Son have taken over the premises at 20, Blythswood Street, Glasgow, C.2, recently occupied by the late Mr. W. B. Martin who was the agent for Gent & Co., in Scotland for this class of equipment.

Mr. Leslie Maynard, London and Home Counties agent for Abboflex, Ltd., Heatovent Electric, Ltd., and other companies, has moved to larger premises at 306a, Fulham Road, London, S.W.10 (Flaxman 8752).

Ekco-Ensign Electric, Ltd., have moved their sales office, showroom and storage depot from Preston to larger and more convenient premises in Blackett Street, Manchester, 12 (telephone: Ardwick 4661).

Financial Section

STOCKS and SHARES

AFTER their sharp recoil in the first half of this month, the industrial markets of the Stock Exchange recovered a more confident air following the West Derby by-election result. This, incidentally, contributed largely to an overwhelming success of the re-issue of 15 million Dorman Long £1 ordinary shares, the application lists for which closed on the day after the election. A great deal of money was tied up temporarily in this operation, and its release was expected to assist other sections of the House. Gilt-edged securities have been little more than steady.

Firmer Markets

Advances of 1s 6d to 2s 6d in I.C.I., English Electrics and G.E.C. are representative of the firmer tendency of prices which developed in the industrial markets. A number of rises were connected with recent dividend and earnings declarations by the companies concerned. Lucas are 3s 9d up, and Plessey 1s 9d better, on further consideration of the results announced earlier in the month. There were improvements also in Crompton Parkinsons and E.M.I. as a sequel to the appearance of the full accounts and reports. Babcocks recovered much of the previous recession. Gains in Pye and some other shares in the "radio" group reflected a rising investment interest in the field of electronics; Elliott Brothers rose further to 45s.

S. Smith Results

Since the declaration of the final dividend and the preliminary profits statement in the middle of this month, S. Smith & Sons (England) 4s ordinary have joined the distinguished company of shares which have doubled in value during the course of the current year. The price at 16s x.d. has more than recovered the amount of the dividend deduction. The results disclosed a 60 per cent increase in the net surplus, which topped the million mark in the face of a much heavier tax charge. The total dividend of 17½ per cent goes to capital increased since last year's 15 per cent payment by a three-for-five scrip issue and by the acquisition of the Kelvin & Hughes interest, but it still involves the distribution of not much more than a quarter of the available surplus, or less than that fraction if the excess profits levy liability is excluded. Yield on the shares now is approximately £4 9s per cent.

Laurence, Scott Issue

The proposal by Laurence, Scott & Electromotors to distribute a 100 per cent scrip issue was read in the market as support for the considerations on the strength of which the price of the 5s shares has risen this year from under 14s to 26s 6d. Points attracting attention to the shares include the fact

The Week's Price Changes

Company or Board	Nom. Value	Middle price 22nd Nov.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1954 Highest	1954 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	97		3	3	3 1 9	97	88⅞
Brit. Elec. 1974/77	100	96	+⅛	3	3	3 2 6	96⅛	87⅛
Brit. Elec. 1976/79	100	101		3½	3½	3 9 4	101½	93 5/16
Brit. Elec. 1974/79	100	111		4¼	4¼	3 16 6	111½	103 5/16
Overseas Electric Supply								
Calcutta Elec.	£1	21/-	−6d	6†	6†	5 14 3	24/6	18/7
East African Power	£1	23/-		7	7	6 1 9	23/4	19/6
Nigerian Elec.	£1	24/-		10	10	8 6 8	25/-	23/6
Palestine Elec. "A"	£1	21/-		Nil	Nil	—	21/-	16/-
Perak Hydro-Elec.	£1	17/6		6	10	11 8 4	20/-	13/9
Equipment and Manufacturing								
Aberdare Cables	5/-	14/-	−3d	25	12½*	4 9 3	14/3	8/1
Aerialite	1/-	14/-	−6d	88⅓	88⅓	6 5 9	14/6	10/9
Allen, W. H.	£1	77/-		15	20	5 4 0	77/-	50/-
Aron Elec. Ord.	£1	60/-		20	15	5 0 0	60/-	43/-
Assoc. Elec. Ord.	£1	60/6		20	11¼*	3 14 6	62/6	41/6
Automatic Tel. & El.	£1	70/-	−9d	15	15	—	73/-	57/3
Babcock & Wilcox	£1	70/9	+2/-	18	12*	3 7 9	76/3	47/3
Baldwin, H. J.	2/-	4/9	−3d	20	20	8 8 6	5/6	3/9
Bakelite	10/-	31/3		12½	12½	3 19 10	32/-	23/6
British Aluminium	£1	39/3	+6d	12	10	5 2 0	40/-	33/9
B.I. Callender's	£1	51/-	−6d	10	10	3 18 6	52/-	37/9
B.I. Callender's 6% Pref.	£1	26/3		6	6	4 11 6	26/6	24/3
British Thermostat	5/-	27/-		35	27½*	—	28/-	12/-
British Vac. Cleaner	5/-	13/6		15	25	9 1 10	14/6	11/6
Brook Motors	10/-	43/9	−1/9	20	20*	—	45/6	29/3
Brush Ord.	5/-	7/9xd		4	6	3 17 3	8/3	3/6
Bulgin, A. F.	1/-	3/9		30	30	8 0 0	3/9	3/2
Burco	5/-	20/-xd	+9d	35	25*	6 5 0	20/-	12/1
Chloride El. Storage "A"	£1	68/-	+1/-	20	12½*	3 13 6	68/6	46/6
Clarke Chapman	£1	68/3	+1/3	17½	20	—	73/-	47/6
Cole, E. K.	5/-	17/6	−6d	25	27½	—	19/6	11/6
Cossor, A. C.	5/-	9/-	−6d	10	10	5 11 0	11/-	7/-
Crabtree	10/-	31/6		17½	20	6 7 0	32/-	23/9
Crompton Parkinson Ord.	5/-	20/-	+1/3	20	20	5 0 0	22/-	14/-
De La Rue	5/-	19/9xd		Nil	20	5 1 3	21/3	12/3
Decca	4/-	49/6	−6d	150	35*	—	51/3	32/-
Desoutter	5/-	25/-		18	20	4 0 0	25/-	16/1
Dewhurst	2/-	7/-		19	19	5 8 6	7/-	5/1
Dictograph Tel.	2/-	7/-xd		20	20	6 3 0	8/-	5/2
Dubilier Condenser	1/-	4/6	+1½d	25	25	—	5/3	3/3
E.M.I.	10/-	21/6xd	+2/-	8	10	4 13 0	23/-	11/3
Electrical Components	5/-	16/3		20	20	6 3 0	16/3	10/9
Elec. Construction	£1	68/9		15	15	4 7 3	68/9	53/-
Enfield Cable Ord.	£1	23/9	−2/6	5	Nil	Nil	26/3	16/6
English Electric	£1	55/-	+2/6	15	10*	3 12 9	59/-	38/-
English Electric 3¾% Pref.	£1	16/9		3¾	3¾	4 9 7	16/9	15/3
Ericsson Tel.	5/-	31/3		22†	25†	2 0 0†*	33/9	22/9
Ever Ready	5/-	24/6		35	40	—	26/3	27/9
Falk Stadelmann	£1	42/6xd	+6d	15	15	7 1 2	42/6	36/6
G.E.C Ord.	£1	60/-	+2/6	11¼	12½	4 3 4	60/-	37/6
G.E.C. 6½% Pref.	£1	27/6		6½	6½	4 14 6	27/6	26/6
General Cables	5/-	17/9		30	30	8 9 0	18/-	16/3
Greenwood & Batley	£1	51/3		17½	17½	6 16 6	51/3	40/3
Hackbridge Cable	5/-	14/9		20	20	6 15 6	15/9	11/3
Hackbridge & Hewittic	5/-	25/-		20	25	5 0 0	25/-	16/10
Hall Tel. Acc.	10/-	12/-		10	10	8 6 8	13/-	10/6
Heatrae	2/-	5/6		12½	12½	4 11 0	5/6	4/-
Henley's	10/-	19/3	+9d	10½	10½	5 9 0	22/-	15/6
Holophane	5/-	17/6		20	25	7 2 9	17/6	13/1

* After capital bonus. † Free of income tax.

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.

that while the last year's distribution was raised from 15 to 20 per cent (including a bonus of 2½ per cent), it was still covered some 3½ times by the distributable profit, despite an exceptionally drastic excess profits levy charge. By itself, the latter took nearly half as much again as the net amount of the ordinary dividend. Without it, the year's earnings would have been equivalent to over 100 per cent on the nominal capital. This figure emphasizes also the desirability of the issue now proposed to bring the issued capital into some more realistic relationship with the value of the assets employed in the business.

in Electrical Investments

Company or Board	Nom. Value	Middle price 22nd Nov.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1954 Highest	1954 Lowest
Equipment and Manufacturing—continued.								
Hoover	5/-	43/-		25	45	5 4 8	51/-	26/3
I.C.I.	£1	41/3	+1/6	13	15	3 12 9*	43/6	26/6
Int. Combustion	5/-	27/-		15	20	3 14 0	30/-	14/6
Johnson & Phillips	£1	47/-xd	+9d	15	15	6 7 9	52/6	47/-
Lancashire Dynamo	£1	56/3		12½	14	4 19 6	59/6	43/-
Laurence, Scott	5/-	26/6	+3d	15	20	3 15 6	26/6	14/-
Lister, R. A.	£1	32/6		9	12	—	33/-	22/6
London Elec. Wire	£1	53/9		15	10*	3 14 6	54/-	38/-
Lucas, J.	£1	47/6	+3/9	10·8	7½*	3 2 9	49/-	25/3
Marryat & Scott	2/-	9/6	+1/3	22½	25	5 5 3	8/3	5/11
Mather & Platt	£1	49/6	−1/6	12½	15	—	53/-	32/-
Metal Industries	£1	33/9		12	9	5 6 6	42/3	29/6
Midland Elec. Mfg.	£1	85/-	+5/-	15	15	3 10 9	85/-	63/-
Morphy-Richards	4/-	25/6		40	35*	5 9 10	26/-	11/4
Murex	£1	51/-	−1/-	15	15	5 17 8	57/-	49/-
Newman Ind.	2/-	2/4½		10	10	8 8 5	2/6	2/-
Oldham & Son	1/-	3/-		17½	17½	5 16 8	3/4	2/5
Parnall (Yate)	5/-	10/7½	+7½d	6	8	3 15 4	11/-	4/3
Parsons, C. A.	£1	56/3	+1/3	12½*	7½*	2 13 4	60/-	38/1
Plessey	10/-	58/9	+1/9	30	20*	3 8 0	58/9	37/10
Pye Deferred	5/-	35/6	+1/3	20	20*	2 16 3	37/-	15/7
Revo	10/-	14/6		27½	9*	6 4 6	20/3	14/-
Reyrolle	£1	87/6		12½	13¾	3 2 10	92/6	66/-
Rheostatic	4/-	15/3	−3d	19	20	5 5 0	15/9	11/-
Richardsons Westgarth	5/-	11/3		15	15*	6 13 4	12/3	6/6
Scottish Cables	4/-	19/3	−6d	20	27½	5 14 2	21/9	12/1
Siemens Ord.	£1	37/-	+3/-	10	10	5 8 1	43/9	33/9
Smith (England), S.	4/-	16/-xd	+3d	15	17½*	4 0 3*	15/-	7/8
Southern Areas	£1	30/9	+9d	6	7½	4 17 6	31/3	17/6
Strand Elec.	5/-	9/9		17½	17½	8 19 6	9/9	8/3
Sturtevant	5/-	22/9		18·1†	18·9*†	—	22/9	14/6
Sun. Elec.	£1	33/9		15	15	8 17 9	33/9	27/6
Switchgear & Cowans	5/-	12/-		22½	10	4 3 4	13/7	9/9
Taylor Tunnicliff	5/-	11/3		25	12½*	5 11 0	12/4	10/7
T.C.C.	10/-	38/9		20	30*	—	38/9	21/3
T.C. & M.	£1	33/6		10	8½*	5 1 6	34/6	30/3
Telephone Mfg.	5/-	9/6xd	+3d	10	10	5 5 3	9/6	7/6
Thorn Elec.	5/-	30/-	+6d	12½	20	3 6 8	30/-	13/3
Thornycroft	£1	49/-	+1/-	15	15	6 2 6	50/-	33/4
Tube Investments	£1	77/6xd	+3/6	15	17½	4 10 2	79/9	60/3
Vactric	5/-	18/-		Nil	10	2 15 6	18/9	7/6
Veritys	5/-	10/3	−3d	10	12½	6 2 0	10/6	5/-
Walsall Conduits	4/-	52/-	+9d	70	70	5 7 8	52/6	44/
Ward & Goldstone	5/-	43/3		45	50	—	43/6	21/-
Watford	2/-	6/6		25	22½*	—	7/3	4/7
Westinghouse Brake	£1	83/9	+1/3	15	16	3 16 9	83/-	60/9
West, Allen	5/-	18/3	+3d	15	17½	4 16 0	19/6	12/7
Wolf Electric	5/-	17/6		15	17½	5 0 0	17/6	11/-
Trusts, Transport and Communications								
Anglo-Am Tel.:								
A Ord.	100	88		6	6	6 16 4	89½	80
Ord.	100	54½		3¾	3¾	6 17 6	55½	52
Anglo-Portuguese	£1	25/3		—	8	6 6 9	25/9	21/-
Brit. Elec. Traction:								
Def. Ord.	5/-	23/-	+1/-	35	50	—	24/-	13/-
Cable & Wireless:								
Ord.	£1	40/6	−6d	8	9	4 9 0	49/6	26/2
4% Loan	100	98½		4	4½	4 1 3	98½	95½
Calcutta Trams	£1	20/6	−1/-	2½†	6†	5 17 0†	24/6	17/1
Cape Elec. Trams	£1	16/-	+6d	5½	7	8 15 0	17/6	12/4
Marconi Marine	£1	32/-	−6d	10	10	6 5 0	35/-	27/6
Oriental Tel. Ord.	£1	96/3		16	16	—	99/1	82/6
Telephone Props.	£1	92/6		—	—	—	92/6	74/6
Telephone Rentals	5/-	10/6		10	10	4 15 3	10/6	9/-

Aerialite Scrip

After dipping at first to 12s 3d on news of an unchanged dividend of 88⅛ per cent, Aerialite 1s shares staged a quick recovery to 14s on the company's subsequently announced proposal of a share-for-share scrip issue. Net profits, after tax, are a little above last year's, which covered the same rate of ordinary distribution roughly twice over. A scrip issue is something which the market has long been expecting from Aerialite, for the present nominal amount of only £75,000 ordinary capital has come to look progressively diminutive in comparison with the size of the assets on the other side of the balance sheet.

B.E.T.

B.E.T. deferred stock is now quoted ex-the big scrip issue, which involved the capitalization of nearly £5 million of the reserves and the issue of two new 5s "A" deferred shares for every 5s unit held. The effect is of course to divide the market quotation by three. As noted here from time to time, the shares have proved to be one of the most successful investments of recent months. This year's dividend was raised from 35 to 50 per cent and it is the company's declared intention (with the usual reservations) to pay a total of 20 per cent, equal to 60 per cent in the old form, on the present capital. After a rise of 1s to 23s in the price of the shares, the prospective yield is thus in the region of 4·3 per cent.

Globe Telegraph Issue

Letters of allotment were due to go out this week in connection with the Globe Telegraph & Trust Company's "rights" issue of more than a million new £1 ordinary shares to existing holders. They are being offered two new shares at par for every £7 old stock. The Trust's business and revenues have been expanding in the years since the changes resulting in 1950 from the reorganization affecting the big investment in Cable & Wireless.

T.I. Report

Tube Investments £1 shares have developed fresh strength since the appearance of the full report, containing Sir Ivan Stedeford's review of the group's affairs. At 77s 6d ex-dividend they show, on the basis of the modestly increased payment of 17½ per cent, a yield of 4½ per cent, the sort of return associated with firm investment confidence in a company's position and prospects. Cheerful confidence is indeed the phrase used by the chairman in looking to the current year. For the great financial and trading strength of the group, he gives credit to the £34 million programme of capital expenditure.

REPORTS and DIVIDENDS

Crompton Parkinson, Ltd.—The report and accounts for the year ended 30th June last now issued confirm the figures given in our issue of 5th November.

In his circulated statement, Mr. A. Parkinson (chairman) says that the past year has seen a substantial economic improvement in most of the countries of the world which they regard as their markets. Business with these markets, expressed in money terms, is the largest they have ever done and in volume probably equals the previous best. The growth of local manufacture in many of the overseas markets has continued and they have assisted this growth by the expansion of the range and capacity of the factories in Australia, India and South Africa. In New Zealand, where they had established a small factory, they have reached the conclusion that the development of their industry cannot hope to secure the government support which they have proved to be necessary under the prevailing economic conditions, and they are therefore ceasing to manufacture. They will continue to meet the requirements in that Dominion by exports from the factories in the United Kingdom.

In Australia they are in the concluding stages of negotiations which have as their objective the bringing together of the two merchanting companies, Noyes Bros. (Sydney), Ltd., and Crompton Parkinson (Sales) Pty., Ltd., with the merchanting business of Noyes Bros. (Melbourne), Ltd. On completion, the merger will give Crompton Parkinson a half interest in the equity of an Australia-wide merchanting organization which will operate under the name of Noyes (Australia), Ltd.

After referring to the proposed increase in capital and the company's educational and training policy, Mr. Parkinson deals with the outlook. He says that abroad conditions are better. There is less actual fighting, thus releasing resources for peaceful development, and there are signs of a reduction of international tension. On the other hand there is ever-increasing competition for the available markets of the world, resulting in a lowering of the average prices obtainable and an increase of the cost of getting the business. At home, too, conditions are continuing to improve.

Burco, Ltd.—The accounts for the year to 30th September last were abstracted in our issue of 12th November. In his statement which accompanies the report and accounts, Mr. D. K. Ward (chairman and managing director) says that the year under review has been one of great activity. The heavy demand for Burco products at the end of 1953 was considerably increased in the summer of this year by the removal of restrictions on hire purchase. By the end of September production had increased to a peak never before attained, and at the date of the report had been stepped up still further.

Contactor Switchgear, Ltd.—The financial results for the year ended 31st July, and the proposal to make a scrip issue of one new ordinary share for every three held, were given in our issue of 29th October.

Mr. H. Rayner (chairman), in his statement, says that it is desirable to extend the factory to increase efficiency and cope with the quicker deliveries that customers are now demanding. It is intended to finance these extensions from present resources. The order book is in a healthy state and present indications are that they can anticipate satisfactory results for the coming year.

Electric & Musical Industries, Ltd.—In his statement which accompanies the report and accounts for the year to 30th June last, Sir Alexander Aikman (chairman) says that turnover has shown a satisfactory increase in all territories, except for Pakistan and the Straits Settlements. Although the total turnover of the foreign subsidiaries shows a reduction of about 4 per cent as compared with the previous year, most of the companies show satisfactory increases. In Argentina and Brazil, however, the turnover measured in sterling was substantially reduced.

Bruce Peebles & Co., Ltd.—The authorized capital is to be increased from £250,000 to £500,000 and a one-for-one scrip issue made to ordinary stockholders, capitalizing £177,780 of general reserve. Treasury consent has been obtained to the issue.

Brook Motors, Ltd.—The profit of the company and its wholly owned subsidiary for the year to 30th September last amounted to £473,068, as compared with £401,844. Of this taxation absorbs £245,330. It is proposed to pay a final dividend of 15 per cent on the 1,141,364 ordinary shares of 10s each, which with an interim dividend of 5 per cent on 998,683, makes 20 per cent (same on the smaller capital).

The General Cable Manufacturing Co., Ltd., is paying a final ordinary dividend of 18 per cent, making 30 per cent for the year (unchanged). The net profit for the year ended 30th September was £88,650 (against £106,538), before deducting taxation of £52,613 (£61,460).

The Sun Electrical Co., Ltd., reports a net profit for the year ended 30th April last of £24,392, as compared with £35,145 for the preceding year, after taxation of £33,966, but including tax overprovision of £1,000 written back. General reserve receives £10,000 and it is proposed to maintain the dividend for the year at 15 per cent. The balance carried forward is £75,915 (against £74,377 brought in).

The Jerusalem Electric & Public Service Corporation, Ltd., announces that the offer by the Palestine Electric Corporation has been accepted in respect of about 82 per cent of the preference shares and 80 per cent of the ordinary shares. To give time for outstanding replies from overseas shareholders the offer was extended until yesterday (Thursday), and the date of completion to 10th December.

Aerialite, Ltd., reports that after providing £93,707 for taxation, the group net profit for the year to 31st May last is £78,886, as compared with £75,886 for 1952–53. Reserves receive £46,936, and it is proposed to pay a final dividend of 55 per cent, maintaining the distribution for the year at 88⅓ per cent. The balance carried forward is £153,129 (against £162,457 brought in).

The company is making a one-for-one scrip issue.

Laurence, Scott & Electromotors, Ltd., are to make a scrip issue of one new "A" ordinary share for each "A" and "B" ordinary share held.

The Electric Furnace Co., Ltd., has declared an interim dividend of 4½ per cent on the ordinary shares (against 3½ per cent).

Enfield Rolling Mills, Ltd., has declared an interim dividend of 5 per cent. In previous years a single payment has been made, that for 1953 being 10 per cent.

Pyrotenax, Ltd., which became a public company in July last, has declared an interim dividend of 15 per cent in respect of the year ended 31st March, 195[illegible].

New Companies

Barnes & Carpenter, Ltd.—Registered 1st November. Capital £50[illegible]. Electrical and electronic engineers and contractors, mechanical engineers, etc. Directors: R. W. Barnes and J. H. Carpenter. Regd. office: 31, Booth Street, Ashton-under-Lyne.

Rotary Electric Co. (Belfast), Ltd.—Registered in Belfast 29th September. Capital £5,000. Electrical, precision and general engineers, radio and television engineers, etc. Directors: G. W. Jennings and Mrs. Eileen D. Jennings. Regd. office: 41, Royal Avenue, Belfast.

British Northern Electrical Appliances (Ilkley), Ltd.—Registered 3rd November. Capital £5,000. Electricians, electronic, radio and mechanical engineers, etc. The first directors are to be appointed by the subscribers. Solicitors: Harrison Sons & Sheen, 7, South Parade, Leeds, 1.

Walmore Electronics, Ltd.—Registered 3rd November. Capital £100 in £1 shares. Objects and other particulars are similar to Ambrex Electrics, Ltd.

Liquidations

Cox's Radio & Electrical Co., Ltd.—Winding up voluntarily. Liquidator, Mr. E. F. Beardsmore, National Provincial Bank Chambers, Five Ways, Birmingham, 15, appointed 8th November. Particulars of claims to the liquidator by 31st December.

Hockley Electric Motor & Engineering Co., Ltd.—In voluntary liquidation. Meeting of members on 13th December at 3, Lloyd Road, Broadstairs, Kent, to receive an account of the winding up by the liquidator, Mr. L. D. Lopes.

Bankruptcies

R. H. Winslade, 7, Collingwood Mount, Portsmouth Road, Camberley, Surrey, electrical engineer.—Last day for receiving proofs for dividend 1st December. Trustee, Mr. W. Norman, 11–12, Finsbury Square, London, E.C.2.

G. L. Searle, 186, Colne Road, Twickenham, Middx, lately carrying on business as an electrical engineer at 309, Portobello Road, London, W.10.—Last day for receiving proofs for dividend 30th November. Trustee, Mr. H. F. Langmaid, Bankruptcy Buildings, Carey Street, London, W.C.2, Official Receiver.

W. J. Layton, 148, Studley Road, Redditch, Worcs, formerly carrying on business at 102, Evesham Street, Redditch, electrical engineer.—Last day for receiving proofs for dividend 1st December. Trustee, Mr. R. K. Clark, Somerset House, 37, Temple Street, Birmingham, 2, Official Receiver.

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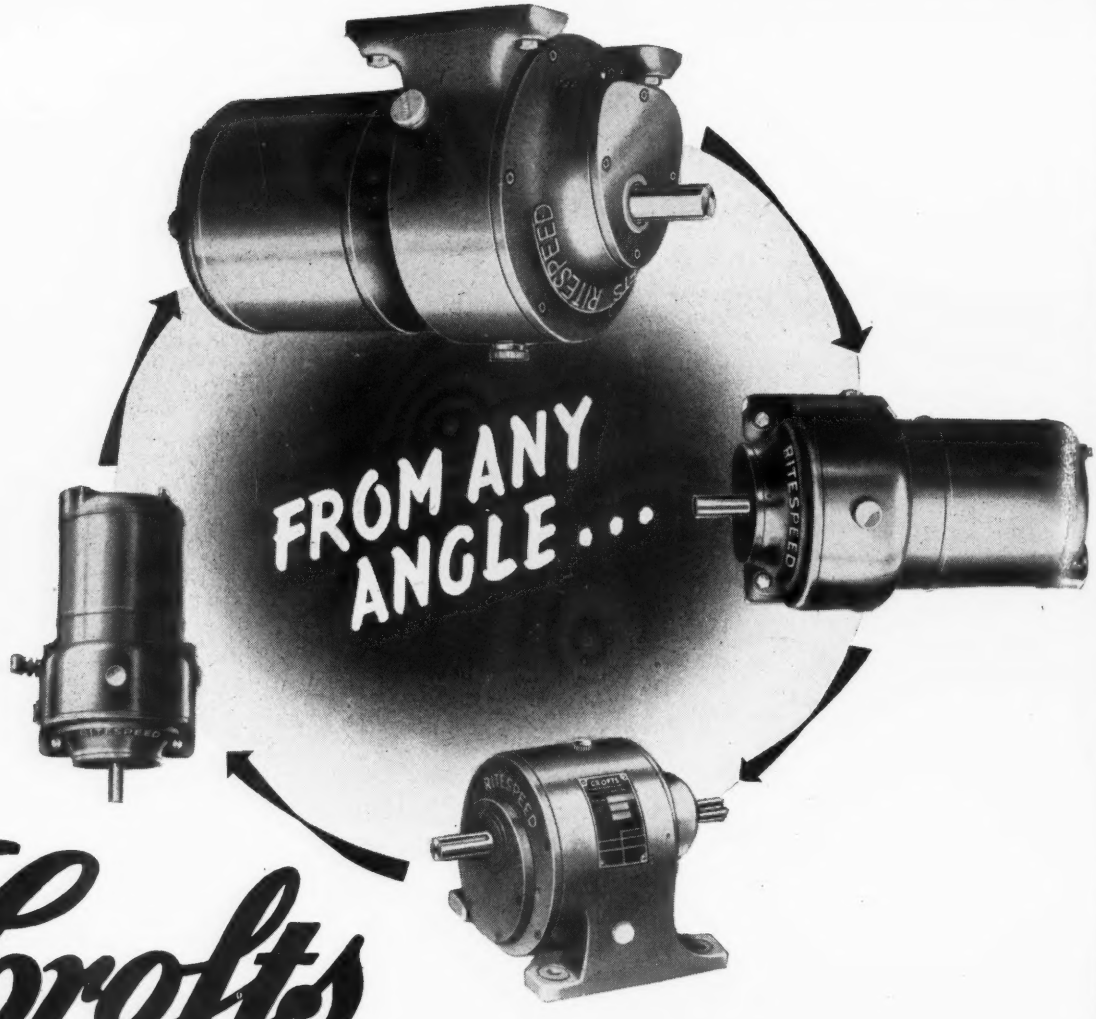

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NEXT WEEK'S EVENTS

Organizers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 231, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged

Monday, 29th November

HULL.—Y.E.B., Ferensway, 7.30 p.m. I.E.S. Leeds Centre. Four short papers on "Industrial Lighting," by members.

LIVERPOOL.—At the Royal Institution, Colquitt Street, 6.30 p.m. I.E.E. Mersey and North Wales Centre. "A Short Modern Review of Fundamental Electromagnetic Theory," by P. Hammond.

LONDON.—Savoy Place, W.C.2. 6 p.m. I.E.E. Radio Section. Soirée.

READING.—George Hotel, 7.15 p.m. I.E.E. district meeting. "Television Interference," by K. R. Seamans.

Tuesday, 30th November

ARBORFIELD.—Camp Cinema, Bailleul Camp, 7 p.m. I.E.E. London Students' Section, district meeting. Film evening.

CAMBRIDGE.—Cavendish Laboratory, 7.45 p.m. I.E.E. East Midland Centre district meeting. "Electricity Supply Problems in Cambridge," by A. C. Eden.

DEWSBURY. — I.E.E. North Midland Students' Section. Visit to Yorkshire Electric Transformer Co., Ltd., at 7 p.m.

EDINBURGH.—25, Charlotta Square, 7 p.m. Institution of Heating and Ventilating Engineers, Scottish Branch. "The Architect and Heating," by A. Steele.

LONDON.—Savoy Place, 5.30 p.m. I.E.E. Measurements Section. Discussion on "The Servicing of Electronic Measuring Instruments and its effect on their Design," opened by Dr. Denis Taylor.

MANCHESTER. — Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Supply Group. "The Electrical Measurement of Steam Turbine Rotor Movements, with special reference to the Operation and Design of Modern Power Plant," by J. L. Ashworth, J. S. Hall and A. H. Gray.

College of Technology, Sackville Street, 7 p.m. British Institution of Radio Engineers, North-Western Section. "Electronics and the Wind Tunnel," by G. J. Scoles.

NORWICH.—Assembly House, 7.30 p.m. I.E.E. district meeting. "The Technique and Development of Automatic Winding in Mine Shafts," by B. L. Metcalf and G. Cuttle.

NOTTINGHAM.—The University, 7 p.m. I.E.E. East Midland Students' Section. "The Electromagnetic Field and its Determination," by G. D. Stairmand.

OXFORD.—Y.M.C.A., 10, George Street, 6.30 p.m. A.S.E.E. Oxford Branch. "Automatic Temperature Control," by D. H. Surgeoner.

Wednesday, 1st December

BIRMINGHAM.—Midland Institute. I.E.E. South Midland Centre. "Nuclear Reactors and Power Production," by Sir Christopher Hinton. (Joint meeting with the Institutions of Civil and Mechanical Engineers.)

James Watt Institute, Great Charles Street, 7 p.m. Junior Institution of Engineers, Midland Section. Chairman's address, "Tropical Aquaria Electrical Apparatus," by C. H. Crawford.

EDINBURGH.—12, Rothesay Place, 7 p.m. I.E.S. Edinburgh Centre. "What do we Know About Lighting ?" by R. J. Fothergill.

GLASGOW.—39, Elmbank Crescent, 7 p.m. I.E.E. South-West Scotland Sub-Centre. "Some Applications of the Electrolytic Tank to Engineering Design Problems," by H. Diggle and E. R. Hartill.

HARRINGAY.—"Queen's Head," 677, Green Lanes, 7.45 p.m. A.S.E.E. North London Branch. "The Weekly Electrical Press," by R. Baldwin.

LONDON.—Savoy Place, 5.30 p.m. I.E.E. Radio Section. "The Vertical Radiation Patterns of Medium-Wave Broadcasting Aerials," by H. Page and G. D. Monteath.

I.E.E. London Students' Section. Visit to G.E.C. Research Laboratories, North Wembley, at 2 p.m.

Dorchester Hotel, 7 for 7.30 p.m. Radio Industry Council. Annual dinner.

John Adam Street, W.C.2, 2.30 p.m. Royal Society of Arts. Llewelyn B. Atkinson Memorial Lecture: "The Insulation of Submarine Telephone Cable," by J. N. Dean.

At the Institution of Mechanical Engineers, Birdcage Walk, 6 p.m. Institution of Heating and Ventilating Engineers. "Problems and Methods of Smoke Prevention," by T. F. Hurley and L. J. Flaws.

MIDDLESBROUGH.—Cleveland Scientific and Technical Institution, 6.30 p.m. I.E.E. Tees-Side Sub-Centre. "Fluorescent Discharge-Tube Circuits and Operating Problems," by J. Cates.

PORTSMOUTH.—College of Technology, 6.30 p.m. I.E.E. Southern Centre. "The Possibilities of a Cross-Channel Power Link between the British and French Supply Systems," by D. P. Sayers, M. E. Laborde and F. J. Lane.

PRESTON. — 49a, Fishergate, 7.30 p.m. A.S.E.E. Preston Branch. "Universal Lighting System," by R. Pye. (Joint meeting with the Illuminating Engineering Society.)

RUGBY.—College of Technology and Arts, 6.30 p.m. I.E.E. Rugby Sub-Centre. "Electrical Energy from the Wind," by E. W. Golding. (Joint meeting with the Rugby Students' Section.)

SWANSEA.—S. Wales Electricity Board's Demonstration Theatre, The Kingsway, 6.30 p.m. I.E.S. Swansea Group. "Lighting for Enjoyment," by T. O. Freeth. (Joint meeting with the Electrical Association for Women.)

WOLVERHAMPTON.—Wolverhampton and Staffordshire Technical College, 7 p.m. I.E.E. South Midland Students' Section. Chairman's address. "Some Applications of Induction Motors," by A. A. Barter.

Thursday, 2nd December

CARDIFF.—S. Wales Electricity Board's Demonstration Theatre, The Hayes, 5.45 p.m. I.E.S. Cardiff Centre. "Lighting for Enjoyment," by T. O. Freeth.

CROYDON.—Café Royal, North End, 8 p.m. A.S.E.E. South London Branch. "Electronics in Industry," by T. S. Worthington.

GLASGOW.—39, Elmbank Crescent, 7.30 p.m. I.E.S. Glasgow Centre. "Dock and Railway Lighting," by W. T. F. Souter.

HULL.—Y.E.B., Ferensway, 7.15 p.m. I.E.E. North Midland Centre, district meeting. "Aluminium Sheathed Cables," by P. M. Hollingsworth and P. A. Raine.

LEICESTER.—Palais-de-Danse. E.I.B.A. East Midlands Area branches. Annual ball.

LONDON.—Savoy Place, 5.30 p.m. Institution of Electrical Engineers. "The Electrification of the Manchester-Sheffield-Wath Lines, Eastern and London Midland Regions, British Railways," by J. A. Broughall and K. J. Cook.

NEWCASTLE-UPON-TYNE.—King's College, 7 p.m. I.E.E. North-Eastern Radio and Measurements Group. "Radio Stars," by R. Hanbury Brown. (Joint meeting with the Newcastle-upon-Tyne Astronomical Society.)

NOTTINGHAM.—E.M.E.B., Smithy Row, 6 p.m. I.E.S. Nottingham Centre. "A New Approach to Lighting Design," by W. Robinson.

PETERBOROUGH.—Eastern Gas Board's Demonstration Theatre, Church Street, 7.30 p.m. Incorporated Plant Engineers, Peterborough Branch. "Railway Electrification."

STAFFORD.—English Electric Co.'s Lecture Room, Salt Avenue/Sabine Street, 7.15 p.m. I.E.E. North Staffs Students' Section. Senior Chairman's address, by J. M. Ferguson.

Friday, 3rd December

BALSALL.—Saracen's Head. I.E.E. Rugby Students' Section. Annual dinner.

BIRMINGHAM.—Midland Hotel. Institution of Heating and Ventilating Engineers, Birmingham and District Branch. Annual dinner.

IPSWICH. — Great White Horse Hotel. Ipswich and District Electrical Association. Annual dinner.

LIVERPOOL.—9, The Temple, 24, Dale Street, 7.30 p.m. A.S.E.E. Liverpool Branch. "Joints for Power Cables," by B. A. Maxted.

LONDON.—21, Albemarle Street, 9 p.m. Royal Institution of Great Britain. "Industrial Power from Nuclear Energy," by Sir Christopher Hinton.

NEWCASTLE-UPON-TYNE.—King's College, 6.30 p.m. I.E.E. North Eastern Students' Section, Tyneside meeting. "A Review of the Development of High-Speed Oscillography," by H. Hollaway.

Saturday, 4th December

GLASGOW.—Rhul Restaurant, 123, Sauchiehall Street. Incorporated Plant Engineers, Glasgow Branch. Annual dinner and dance.

LONDON.—I.E.E. London Students' Section. Visit to Guinness Brewery, Park Royal, N.W.10, at 10 a.m.

South African Electrical Trade

THE values of the imports of the chief groups of electrical goods into the Union of South Africa last year are shown in the accompanying statement with notes of increase or decrease on 1952. Overall there was an increase of about 15 per cent. It will be seen that the only noteworthy decrease was in batteries and parts, and that imports of cable and wire (other than rubber insulated) were considerably more than doubled.

Exports of electric cable and wire in 1953 were valued at £1,142,000 compared with £1,396,000 during the previous year, and of machinery and parts, not agricultural, £6,494,000 against £5,769,000. Batteries, not rechargeable, were exported in 1953 to the value of £111,000 against £107,000 in the preceding year, and batteries rechargeable £162,000 (£146,000).

Class of Goods	1953 £ (000)	Inc. or dec. on 1952 £ (000)
Batteries and parts	54	− 40
Dynamos and generators ...	395	+ 17
Motors...	192	—
Transformers	188	+ 47
Cable and wire (rubber insulated)	24	− 6
Cable and wire (other) ...	184	+ 105
Electric stoves and parts ...	17	+ 4
Lamp bulbs	32	+ 11
Radio apparatus and accessories	120	+ 25

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 29th December from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1948

20737. British Telecommunications Research, Ltd., Holloway, D. G., and Felix, M. O.—Apparatus for use in frequency-responsive electrical remote control systems. 29th July, 1949. (721041.)

1949

24775. Compagnie des Freins & Signaux Westinghouse.—Semi-conductors for control purpose. 27th September, 1949. (721042.)

27735. British Communications Corporation, Ltd., Heftman, T. S., and Siekierski, W.—Electric power supply apparatus. 29th January, 1951. (721142.)

1950

31492/3. Suchy Holdings, Ltd., Suchy, C. T., Richards, H. E. G., and McAuley, D. J.—Electric resistance heating elements. 28th February, 1952. (721043/4.)

1951

17925. Simplex Electric Co., Ltd.—Gland fitting for electric cables. 25th July, 1952. (721047.)

27641. Heinrich, D. O.—Electrostatic precipitators. 9th February, 1954. (721158.)

27643. Collecting electrodes of electro-precipitators. 26th November, 1951. (721159.)

1952

14736. Sangamo Weston, Ltd.—Electronic direct current amplifiers. 8th January, 1953. (721055.)

18285. Branson, L. C.—Electronic counting devices. 2nd July, 1953. (721058.)

20064. Telefonaktiebolaget L. M. Ericsson.—Pulse counting circuits comprising electron tubes. 8th August, 1952. (721060.)

1953

3674. Westinghouse Electric International Co.—Electric motor control systems. 10th February, 1953. (721084.)

4720. Sangamo Weston, Ltd.—Movable coil electrical instruments. 19th February, 1953. (720744.)

5113. Westinghouse Electric International Co.—Sealing of mounts in glass or vitreous bulbs for electric lamps, electronic tubes and like evacuated electrical devices. 24th February, 1953. (720750.)

5176. Perivale Clock Manufacturing Co., Ltd., and Brown, T. A.—Synchronous electric striking or striking and chiming clocks. 24th February, 1953. (720752.)

5545. General Electric Co.—Magnetic amplifier systems. 27th February, 1953. (720761.)

5872. Philips Electrical Industries, Ltd.—Circuits for synchronizing a saw-tooth oscillator. 3rd March, 1953. (720773.)

5883. Mallory Metallurgical Products, Ltd.—Electrical contacts and contact materials and a method of manufacture thereof. 3rd March, 1953. (720774.)

5911. General Electric Co.—Magnetic focusing devices for electron beams. 3rd March, 1953. (720776.)

6001. Patterson & Associates, Inc., V. C.—Heat-pump water heater. 4th March, 1953. (720779.)

6113. Westinghouse Electric International Co.—Electric discharge lamps. 5th March, 1953. (720783.)

6434. Philips Electrical Industries, Ltd.—Electric discharge tubes and glass bases therefor. 9th March, 1953. (720792.)

6794. Allmanna Svenska Elektriska Aktiebolaget.—Electrometer amplifier. 12th March, 1953. (720805.) 6795. Mounting of excitation coils in a.c. machines. 12th March, 1953. (720806.)

6989. Aktiebolaget Gerber & Hesslow.—Electric motors. 13th March, 1953. (720809.)

7334. Philips Electrical Industries, Ltd.—Resonator systems for discharge tubes. 17th March, 1953. (720820.)

7486. British Thomson-Houston Co., Ltd.—Filament mounting method and apparatus. 18th March, 1953. (720824.)

7635. General Electric Co.—Waste disposal apparatus. 19th March, 1953. (720828.)

7815. Eutectic Welding Alloys Co., Ltd.—Coated welding electrode. 20th March, 1953. (720834.)

8104. General Electric Co.—Preparation of cadmium selenide. 24th March, 1953. (720842.)

8350, 11796, 15286 and 18312. General Motors Corporation.—Refrigerator. 26th March, 29th April, 3rd June and 2nd July. (720849/936/981 and 721016.)

8887. Westinghouse Electric International Co.—Glow switches. 31st March, 1953. (720864.)

9059. Philips Electrical Industries, Ltd.—Electric discharge tubes of the kind comprising a mercury cathode and a gas filling. 1st April, 1953. (720869.)

9778. Kohnstam, Ltd., J.—Electrical connectors. 10th April, 1953. (720908.)

9794. Standard Telephones & Cables, Ltd. (Nippon Electric Co., Ltd.).—Method of manufacturing thermistors. 10th April, 1953. (720909.)

10024. Rome Cable Corporation—High voltage spark tester for self-supporting cable with bare messenger. 13th April, 1953. (720913.)

10571. Standard Telephones & Cables, Ltd.—Construction of a fused capacitor unit. 17th April, 1953. (720892.) 10573. Multi-channel carrier transmission system provided with an automatic level control. 17th April, 1953. (720893.)

10579. Naamlooze Vennootschap Coq.—Electrical insulating assemblies for leading a rod-shaped conductor carrying high voltage into a casing. 17th April, 1953. (720894.)

10680. General Motors Corporation.—Electrical switches for example for use with vehicle direction indicator systems. 20th April, 1953. (720898.) 10681. Resistor grid for electric traction systems. 20th April, 1953. (720899.)

11187. Singer Manufacturing Co.—Electric clutch-brake motor. 23rd April, 1953. (720927.)

11718. General Electric Co.—Cooling arrangements for refrigerating systems. 28th April, 1953. (720932.) 15423 and 21038. Refrigerators. 4th June and 29th July, 1953. (720985 and 721116.)

11827. Easipower, Ltd., and Williams, F. R.—Electrically heated smoothing irons. 29th April, 1953. (720939.)

12129/30. Philips Electrical Industries, Ltd.—Methods of manufacturing cathode-ray tubes comprising a glass cone and a glass window. 1st May, 1953. (720947/8.)

12369. Ruben, S.—Primary electric cell. 4th May, 1953. (720953.)

12462. Mullard Radio Valve Co., Ltd.—Resistors. 5th May, 1953. (720955.)

13120. Sulzer Freres Soc. Anon.—Steam generating plants which employ electric motors. 11th May, 1953. (721099.)

13523. Philips Electrical Industries, Ltd.—Circuits for use in frequency-shift telegraphy transmitters. 14th May, 1953. (721105.) 13524. Frequency-stabilized oscillator circuit arrangements. 14th May, 1953. (721106.)

13646. Sperry Corporation.—Automatic control systems for synchronizing an electric oscillator to a train of pulses. 15th May, 1953. (721108.)

13661. Standard Telephones & Cables, Ltd.—Method of making selenium rectifiers. 15th May, 1953. (721109.)

13853. Ateliers de Constructions Electriques de Charleroi.—Coils with variable coefficient of self-induction. 18th May, 1953. (720960.)

14127. Montanari, E.—Insulating sleeves for electric cables and a method of making same. 20th May, 1953. (720962.)

14481. Standard Telephones & Cables, Ltd. (Nippon Electric Co., Ltd.).—Carrier current communication systems. 22nd May, 1953. (720968.)

15285. General Motors Corporation—Electric switches operable by liquid pressure. 3rd June, 1953. (720980.)

15326. Philips Electrical Industries, Ltd.—Electric discharge tubes for decimetre and centimetre waves. 3rd June, 1953. (720982.)

15556. General Electric Co.—Electric lamp shields. 5th June, 1953. (720989.)

15989. Philips Electrical Industries, Ltd.—Circuit arrangements for supplying directly heated cathodes of discharge tubes. 10th June, 1953. (720991.)

16553. Western Electric Co., Inc.—Electrolytic capacitors. 16th June, 1953. (720995.)

16919. Ruhrchemie Akt.-Ges.—Dielectrics. 18th June, 1953. (721000.)

17341. Westinghouse Electric International Co.—Dynamo-electric machines. 23rd June, 1953. (721005.)

17580. Bosch Ges., R.—Self-sealing electric condensers. 25th June, 1953. (721008.)

17683. Compagnie Electro-Mecanique.—Device for positioning stators and dummy rotors in stator-winding machines. 25th June, 1953. (721010.)

18110. General Electric Co.—Glass-to-metal seals. 30th June, 1953. (721015.)

18501. Philips Electrical Industries, Ltd.—Arc welding. 3rd July, 1953. (721017.)

19225. Standard Telephones & Cables, Ltd.—Process for external profiling of semiconductor devices. 10th July, 1953. (721026.)

20056. General Electric Co.—Automatic coffee percolators. 20th July, 1953. (721034.)

20899. Philips Electrical Industries, Ltd.—Lighting and like circuits. 28th July, 1953. (721112.)

20955. National Lead Co.—Manufacture of electric storage batteries. 28th July, 1953. (721114.)

21618. Compagnie Générale d'Electricité.—Method of manufacturing star-quad telephone cables, and cables obtained by this method of manufacture. 5th August, 1953. (721119.)

22108. Allmanna Svenska Elektriska Aktiebolaget.—Electromagnetic stirring winding for melting furnaces and the like. 11th August, 1953. (721124.)

22353. British Thomson-Houston Co., Ltd.—Street lighting apparatus. 13th August, 1953. (721125.)

24408. General Electric Co.—Stators for dynamo-electric machines. 3rd September, 1953. (721132.)

24829. General Electric Co.—Electrically heated heating units for ranges. 8th September, 1953. (721135.)

25856. General Electric Co.—Insulated electric conductors. 18th September, 1953. (721138.)

26220. Philips Electrical Industries, Ltd.—Circuit arrangements for charging capacitors. 23rd September, 1953. (721139.)

GENERATION AND DEVELOPMENT

Increased Output

Last month 6,241 million kWh was generated by the British Electricity Authority and the North of Scotland Hydro-Electric Board, an increase of 7·2 per cent over the October, 1953, output (see Table I). At the end of the month the total installed plant capacity was 19,832 MW against 19,815 MW at the end of September. Since the beginning of the year 663 MW of additional plant has been installed.

Plant installed at B.E.A. stations last month comprised two boilers, both International Combustion units, at Nechells "B" (230 k lb/hr) and Portobello (540 k lb/hr), and two diesel engine generators, namely a 2,000 kW Mirrlees, Bickerton & Day set at Ashford, Kent, and a 1,280 kW Harland & Wolff set at Blackpool. These two diesel sets are the first of the 50,000 kW of plant of this kind ordered by the Authority, for installation by the end of this year, as a short-term measure to assist in overcoming the plant shortage.

Table II analyses the Electricity Boards' sales. The national figures show an increase over October, 1953, of 6·9 per cent, but when corrected for weather conditions which were warmer than a year earlier, the increase is 10·4 per cent. The number of effective working days was 28·08 against 28·42 in October, 1953.

15,000 Mile Cable Chain

To improve communications between the United Kingdom and Australia a 15,000 mile cable chain, the longest unbroken cable and land-line circuit ever formed, is being set up to link Sydney with London direct, via Canada.

Tests extending over several weeks have been carried out by Cable & Wireless, Ltd., in collaboration with the Overseas Telecommunications Commission (Australia), the New Zealand Department of Posts and Telegraphs, the Canadian Overseas Telecommunication Corporation and the United Kingdom Post Office.

The circuit will run from Sydney through nine cable stations, including Fanning Island; Bamfield, near Vancouver; Halifax, Nova Scotia; the Azores; and Porthcurno, near Land's End. The chain will include the longest submarine cable in the world—the 3,466 mile cable between Fanning Island and Bamfield—and a land-line across Canada. The chain will work in the direction Australia to the United Kingdom during the Australian day, and in the opposite direction during the United Kingdom day.

The longest cable chain previously formed ran from London to Adelaide, via Aden, a distance of approximately 13,500 miles.

Request for Stamp Scheme

Nantwich (Cheshire) R.D.C. is making a further approach to the Merseyside and North Wales Electricity Board, asking for a "savings stamp" scheme to be adopted for the payment of electricity accounts.

Pumping Station Electrification

Hull Corporation Water Committee has considered a report on the renewal of plant at the Springhead pumping station and has recommended the adoption of a scheme, estimated to cost £38,486, for an all-electric installation with a complete diesel-electric stand-by. Additional expenditure on alterations to buildings, dismantling of existing machinery and the installation of new booster plant is estimated at £32,000, making a total of £70,486.

Additional Supply to Pumping Station

The Ilford and Barking Joint Sewerage Committee has recommended that a scheme for the provision of 1,000 kVA from the London Electricity Board to the pumping station should be approved at an estimated cost of £10,000.

Supergrid Route Approved

The Minister of Fuel and Power has approved the British Electricity Authority's plan to erect a 275 kV overhead line (part of the Staythorpe–Elstree section of the supergrid) through Dunstable.

Rural Supplies

Cumberland County Council has approved plans by the North Western Electricity Board for the proposed Ivegill rural area electrification scheme.

Power Station Inquiry

The British Electricity Authority's scheme for the construction of a £30,000,000 power station at Cambois (Northumberland) will be the subject of a public inquiry early in the New Year. Blyth Corporation is objecting to the proposed system of discharging waste from the station. The names of other objectors have not yet been disclosed.

New Dutch Power Station

The new "Zeeland" power station at Flushing was opened recently by the Netherlands Minister of Economic Affairs. As a result, electricity production in Zeeland Province, until then derived from three power stations, has been concentrated in one modern unit. Coal consumption per kWh is 45 per cent lower than that of any of the old stations which have now been withdrawn from service. A new 50 kV and 10 kV system for the transmission of energy to the various centres of consumption was also completed recently.

Atomic Power for New York

The New York correspondent of *The Times* quotes a spokesman of the Consolidated Edison Co. as saying that his company was pursuing a scheme for the erection of an atomic power station to supply electricity in New York City as a matter of some urgency. He thought that such a station would take at least five years to build and that consumers could not expect to get their power cheaper than that from the conventional power plant.

TABLE I.—ELECTRICITY GENERATED AND PLANT INSTALLED*

	Fuel consumed Thousand tons			kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Coke and Breeze	Oil	Steam	Water power	Total†		
British Electricity Authority ...	3,203	84	17·6	5,999	76	6,082	5,716	19,241
N. of Scotland H.E.B.	6	1	1·1	10	145	159	158	591
Total for October, 1954 ...	3,209	85	18·7	6,009	221	6,241	5,874	19,832
Corres. total for October, 1953	3,131	73	9·8	5,686	128	5,828	5,483	18,594
Increase or decrease, per cent ...	+2·5	+16·4	+90·8	+5·7	+72·7	+7·1	+7·1	+6·7
Total to date (10 months), 1954...	31,017	909	129·3	57,198	1,244	58,557	55,049	
Total for corres. 10 months of 1953	28,811	739	73·2	51,830	918	52,880	49,736	
Increase or decrease, per cent ...	+7·7	+23·0	+76·6	+10·4	+35·5	+10·7	+10·7	

* Comprising all generating stations controlled by the British Electricity Authority and the North of Scotland Hydro-Electric Board.
† Including 7 million kWh generated by oil engines and 4 million by waste heat plants in October, 1954.

TABLE II.—ELECTRICITY SENT OUT BY AREA BOARDS TO THEIR CONSUMERS

Area Board	Totals for October (million kWh)			Twelve Months Totals Ended 31st October (million kWh)		
	1953	1954	Inc. or Dec. %	1953	1954	Inc. or Dec. %
London	487·4	491·3	+ 0·8	5,680·8	5,952·6	+ 4·8
South Eastern	289·7	299·6	+ 3·4	3,340·0	3,573·0	+ 7·0
Southern	341·9	365·4	+ 6·9	3,910·4	4,222·9	+ 8·0
South Western	168·8	191·9	+13·7	1,888·2	2,152·4	+14·0
Eastern	472·9	496·9	+ 5·1	5,419·6	5,808·8	+ 7·2
East Midlands*	408·7	444·4	+ 8·7	4,628·0	4,952·5	+ 7·0
Midlands*	554·0	580·2	+ 4·7	6,118·9	6,687·1	+ 9·3
South Wales*	317·7	350·1	+10·2	3,421·7	3,862·0	+12·9
Merseyside and N. Wales* ...	304·4	343·7	+12·9	3,429·1	3,807·2	+11·0
Yorkshire*	540·8	571·2	+ 5·6	5,997·4	6,485·1	+ 8·1
North Eastern*	321·6	340·4	+ 5·8	3,601·3	3,859·1	+ 7·2
North Western*	607·2	637·5	+ 5·0	6,666·7	7,253·0	+ 8·8
South East Scotland	115·5	126·1	+ 9·2	1,282·4	1,414·0	+10·3
South West Scotland* ...	277·5	302·0	+ 8·8	3,098·8	3,392·1	+ 9·5
Total all Area Boards ...	5,208·1	5,540·7	+ 6·4	58,483·3	63,421·8	+ 8·4
Direct Supplies by Central Authority	86·1	120·7	+40·2	921·1	1,173·9	+27·4
Grand Total	5,294·2	5,661·4	+ 6·9	59,404·4	64,595·7	+ 8·7
Mainly Industrial Areas* ...	3,331·9	3,569·5	+ 7·1	36,961·9	40,298·1	+ 9·0
Mainly Non-Industrial Areas	1,876·2	1,971·2	+ 5·1	21,521·4	23,123·7	+ 7·4

* Those in which industrial consumers took over 50% of the total sales in the preceding financial year.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—15th December. State Electricity Commission of Queensland, Brisbane. 132 kV, 66 kV and 33 kV switchgear and post insulators. (E.S.B. 27034/54. Ten/11505.)* 22nd December. Eighty-five distribution transformers. (E.S.B. 27023/54. Ten/11491.)* 26th January. Ash handling plant at Hume Street power station. (E.S.B. 26493/54. Ten/11436.)*

3rd February. Electricity Trust of South Australia, Adelaide. Turbo-alternator condensing and feed heating plant for Port Augusta "B" power station. (E.S.B. 26634/54. Ten/11441.)*

Belfast.—16th December. City Electricity Department. Metering equipment for Power Station West. (See this issue.) 6th January. L.p. piping for power station extension. (See this issue.)

Clydebank.—7th December. Burgh Council. Street lighting equipment. (See this issue.)

Colombia.—Indurayon Consolidada, S.A., Barranquilla. Two 80,000 lb/hr boilers and three 2,000 kW turbo-generators. (E.S.B. 26845/54. Com/9867.)*

Cork.—1st December. Commissioner of Public Works. Electrical installation at Cork Custom House. J. Tyrrell, secretary, Office of Public Works, Dublin.

Dagenham.—4th December. Borough Council. Electrical work in connection with school maintenance. Contractors wishing their names to be placed on an approved list should apply to the borough engineer, Civic Centre.

Durham.—7th December. County Council. Electrical installation at fire station. County architect, Court Lane.

Formosa.—15th December. Central Trust of China, Taipei. Underground cable and oil circuit breakers. (E.S.B. 26772/54. Ten/11474.)* Electric furnace and measuring and testing equipment. (E.S.B. 26699/54. Ten/11461.)*

Heston and Isleworth.—10th December. Town Council. Street lighting improvements. (See this issue.)

India.—1st December. Stores Purchase Committee, Government of Mysore, Bangalore. 10,000 suspension disc insulators. (E.S.B. 27001/54. Ten/11484.)*

Jordan.—10th January. Municipality of Nablus. Diesel generators h.v. and l.v. distribution, 6,600 and 415 V switchgear and 6,600/433 V transformers. (E.S.B. 27152/53. Ten/11515.)*

Kuwait.—11th December. Government Department of Electricity. Insulated hard drawn copper cable, insulated cutouts and timber preservative. (E.S.B. 27045/54. Ten/11487.)* 21st December. Junction boxes, flexible metallic conduit and steel conduit. (E.S.B. 27044/54. Ten/11485.)*

Manchester.—6th December. City Council. Two welding sets, one electrical test bench and one fuel pump test bench. City surveyor, Town Hall, 2.

New Zealand.—19th January. New Zealand Post Office, Wellington. Electric fans. (E.S.B. 26776/54. Ten/11466.)* 25th January. Coaxial cable. (E.S.B. 26778/54. Ten/11476.)* 21st January. Adhesive insulated tape. (E.S.B. 27170/54. Ten/11516.)*

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

Newcastle-on-Tyne.—8th December. City Council. Electrical installations in 1,008 houses, St. Anthony's estate. City architect, 18, Cloth Market.

Port Talbot.—Wales Gas Board. Electrical installation for four banks of purifiers, compressor house and substation, offices and workshops; also road lighting. General manager and secretary, 18, Station Road.

Pudsey.—7th December. Highways Department. Hand-propelled electric truck. (See this issue.)

South Africa.—9th December. Union Tender and Supplies Board, Pretoria. Magneto extension bells. (E.S.B. 26798/54. Ten/11458.)*

17th December. Stores Department, South African Railways, Johannesburg. Underground cable and copper wire. (E.S.B. 27101/54. Ten/11503.)*

Southern Rhodesia.—3rd December. Tender Board, Causeway. Magneto telephones. (E.S.B. 26695/54. Ten/11449.)* Indoor telephone distribution wire. (E.S.B. 26692/54. Ten/11451.)*

15th December. Bulawayo Electricity Department. Polyphase maximum demand metering equipment, portable substandard and h.v. cable fault locating bridge. (E.S.B. 25614/54. Ten/11437.)*

6th December. Rhodesia Railways, Bulawayo. Cable. (E.S.B. 26976/54. Ten/11493.)*

8th February. Salisbury Electricity Department. Substation alarm system. (E.S.B. 27116/54. Ten/11497.)*

United States.—4th January. Seattle District, U.S. Army Corps of Engineers. Four main control steel switchboards. (E.S.B. 26736/54. Ten/11489.)*

9th December. Bureau of Information, Denver, Colorado. Transformers and lightning arrestors for Pierre substation. (E.S.B. 27060/54. Ten/11509.)*

Uruguay.—7th December. Servicio Oficial de Difusion Radio Electrica. Valves, condensers and resistances. (E.S.B. 26681/54. Ten/11447.)*

15th December. Usinas Electricas y los Telefonos del Estado, Montevideo. Material for indoor transformer substations. (E.S.B. 26407/54. Ten/11459.)* 21st December. Electrical protection, measuring and regulating equipment. (E.S.B. 26409/54. Ten/11446.)*

Wandsworth.—31st December. Borough Council. Electric lamps for one year. Borough engineer, Municipal Buildings, S.W.18.

Wembley.—18th December. Borough Council. Electric lamps for one year. Maintenance and transport engineer.

ORDERS PLACED

Cottingham (Yorks).—Leeds Regional Hospital Board. Installation of underground cables and street lighting at Castle Hill Hospital, Cotttingham (£2,622).—T. A. Garness.

Grantham.—Corporation. Recommended. Street lighting conversion scheme for various streets (£16,207).—G.E.C.

Mitcham.—Corporation Recommended. Erection of sodium discharge lamps for street lighting improvement scheme (£7,525).—Revo Electric Co.

Northampton.—Markets and Town Hall Committee. Recommended. Electrical installation work in the Guildhall and Dychurch Lane offices, stage 4 (£2,735).—H. A. Cawdell.

Plymouth.—City Council. Recommended. Electrical installation work, Chaucer Way extension and Manadon Vale estates (£1,676).—Madge & Son.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aldridge.—£51,000 scheme as first stage of comprehensive plan for provision of shopping facilities; U.D.C. surveyor, Daw End, Rushall, near Walsall.

Audenshaw.—Houses (56), St. Annes Road, for U.D.C.; Wilfred Thorpe & H. Hirst Smith, architects, 65, Barton Arcade, Deansgate, Manchester.

Bath.—Erection of new King Edward's School at Bathampton (£120,000) and girls' secondary school at Bath (£140,000); T. Wilkinson, planning officer.

Birmingham.—Completion of Bush House scheme, Broad Street (£427,000), to provide headquarters for the Housing Management and Estate Departments; A. G. Sheppard Fidler, city architect.

Cardiff.—Departmental stores; British Home Stores, Ltd., 129/137, Marylebone Road, London, N.W.1

Dagenham.—Factory, Fowler Road, Hainault; B. Berger & Co., Ltd., 176, Albion Road, London, N.16.

Ealing.—Factory, Brentham Halt Road; Permutit Co., Ltd., water treatment equipment manufacturers, Gunnersbury Avenue, London, W.4.

Hillingdon.—Maternity department for Hillingdon Hospital; North West Metropolitan Regional Hospital Board, 11, Portland Place, London, W.1.

London.—Reinstatement, Dominion House, Bartholomew Close; Browett, Taylor & Co., surveyors, 3, Lincoln's Inn Fields, W.C.2.

Shops and offices, Gray's Inn Road; Gee, Walker & Slater, Ltd., builders, 100, Park Lane, W.1.

Reinstatement of printing works, etc., at Tower House, Hopton Street; Alleyn & Mansell, architects, Staple Inn Buildings, Holborn, W.C.1.

Manchester.—Extensions to factory, Harper Road, Wythenshawe, for Isola Manufacturing Co., Ltd.; Percy Wright, architect, 5, Jordangate, Macclesfield.

Baths establishment (£227,305); city architect.

Middlesbrough.—Factory and offices, Cannon Street, for Middleton and Co., wholesale chemists, Boundary Road.

Newton Aycliffe.—First stage of new secondary modern schools (£23,243); county architect, Durham.

Peterborough.—Police headquarters; Stirling, Lambert & Partners, engineers, 8, Station Chambers.

Port Talbot.—Scheme of expansion of Abbey Works, Margam, for the Steel Co. of Wales, Ltd.; Atkins & Partners, engineers, 158, Victoria Street, London, S.W.1.

Reading.—Westwood Secondary School; H. A. Sandford, electrical consultant, 2, Gate Street, London, W.C.2.

Scarborough.—Proposed block of flats, Seacliffe Road; Moore and Son, builders, Seamer Road.

Sodbury.—Houses (about 4,000) on sites in connection with Bristol overspill; R.D.C. surveyor, Council Offices, Chipping Sodbury.

Stockton-on-Tees.—Municipal offices and hall; borough architect, 28, The Square.

Sunderland.—Houses (640) on extension to Hylton Red House estate; borough architect, Grange House, Stockton Road.

West Ham.—Large housing development at Stanford-le-Hope and Corringham; borough engineer, Town Hall, London, E.15.

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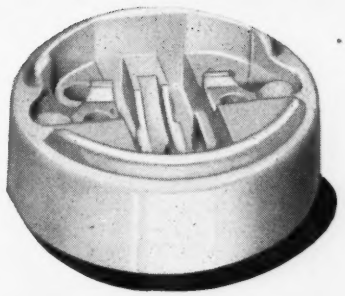

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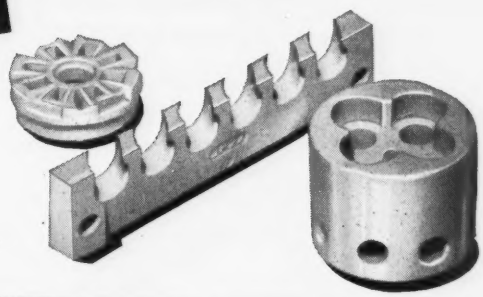

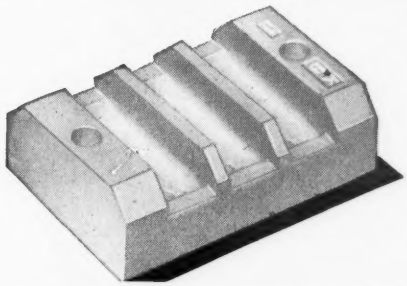

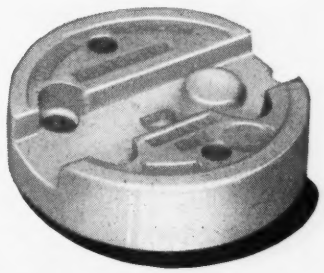

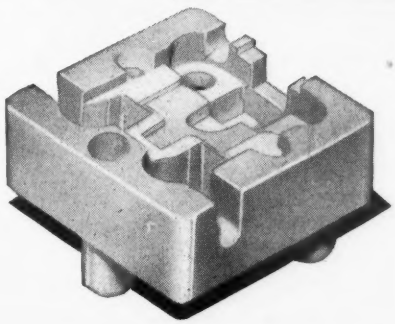

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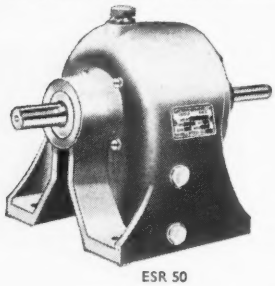

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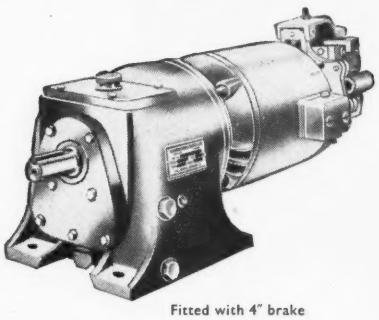

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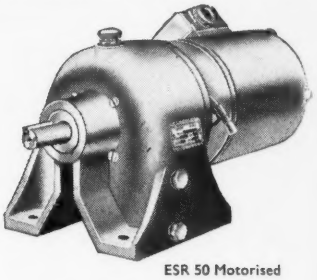

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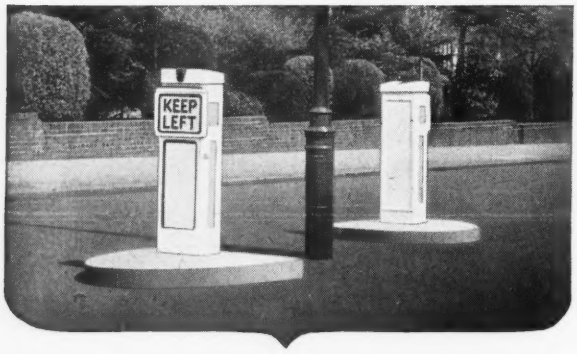

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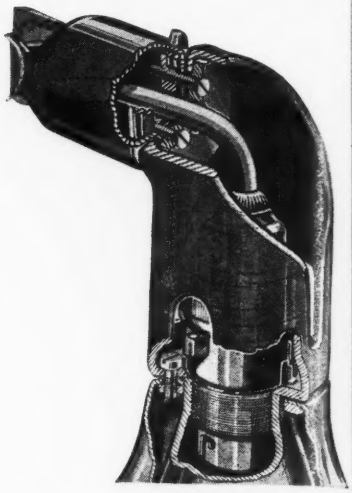

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The Swivelling Head carries the reflector and protects the lampholder from accidental damage, openings being provided for access to the push-bar. "Sudsproof" and "Edison Screw" types are also available. Six sizes of reflector.

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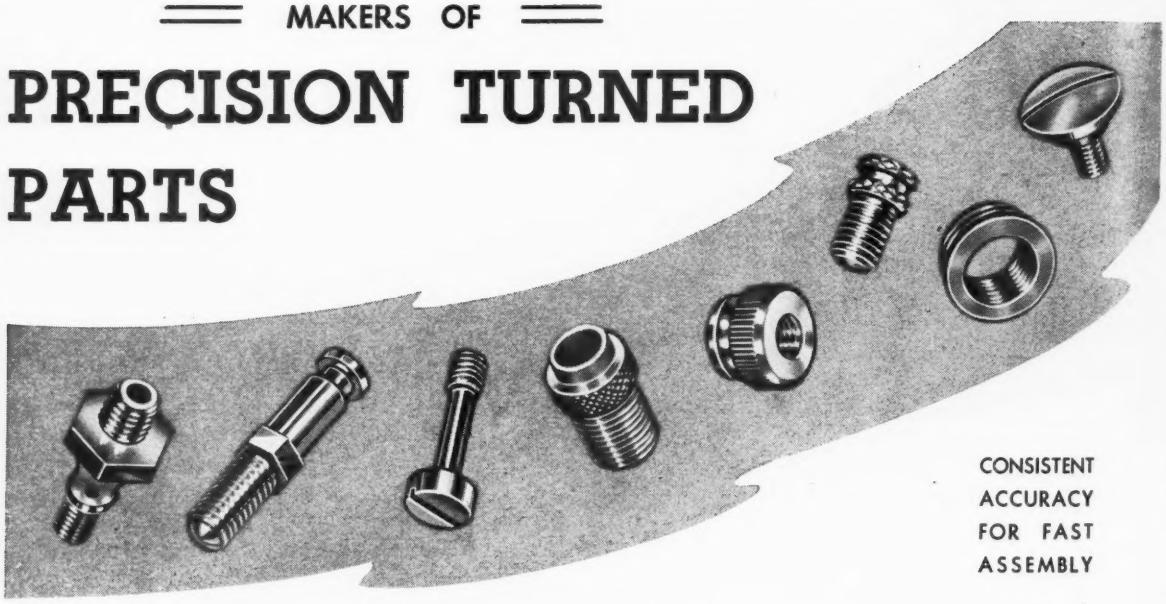

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BICC 69kV Impregnated Pressure Cable was chosen for this task by the State Electricity Commission of Rio Grande do Sul — in the face of international competition — because of the technical and economic advantages it offered.

Two three-core cables, each approximately 4,500 metres long, provide the link. BICC also supplied ancillary equipment, joints, terminals, etc. Installation was carried out by the State Electricity Commission under the supervision of skilled personnel of BIC Construction Company, a BICC associate.

BICC are specialists in high voltage transmission, both underground and overhead, at all voltages up to 275,000 volts. Some other I.P. cable contracts at present in hand are listed below.

* **69,000 volt Impregnated Pressure Cable**

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16km of 132kV three-core I.P. cable are being installed by the BICC Group in Sydney for the State Electricity Commission of New South Wales. A subsequent contract from the Brisbane City Council calls for the supply and installation of 50km of aluminium sheathed 33kV three-core I.P. cable.

PORTUGAL

12km of 33kV three-core I.P. cable are to be supplied and installed in Lisbon by BICC for Lisbon Electric Tramways Ltd.

S. AFRICA

37km of 66kV three-core I.P. cable have been supplied to the Cape Western Undertaking of the Electricity Supply Commission of S. Africa by British Insulated Cables (S.A.) Ltd., a BICC associate. The cable will shortly be commissioned in Cape Town.

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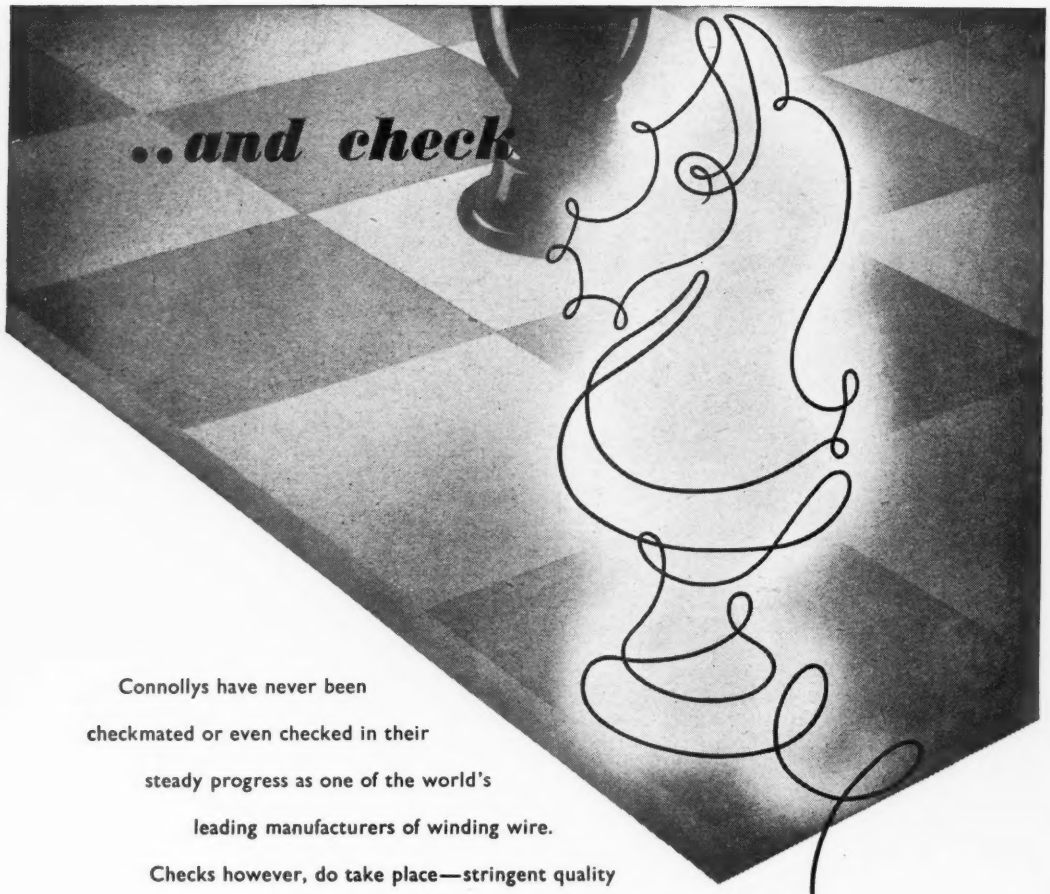

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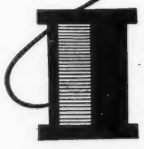

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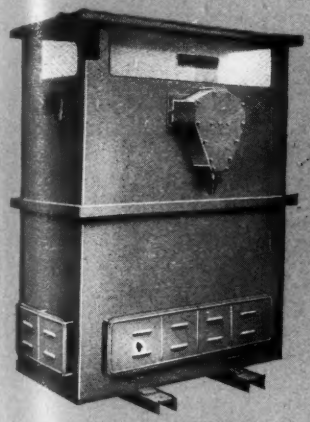

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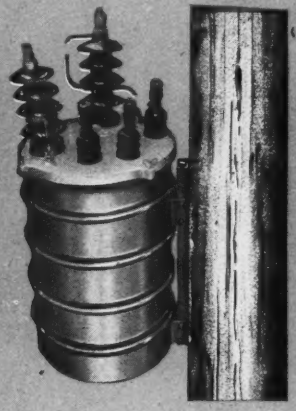

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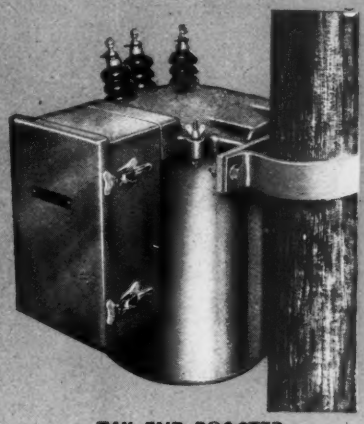

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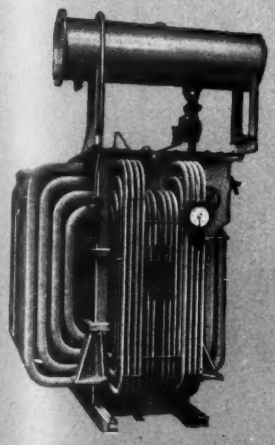

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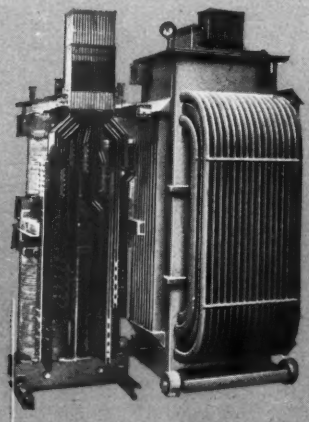

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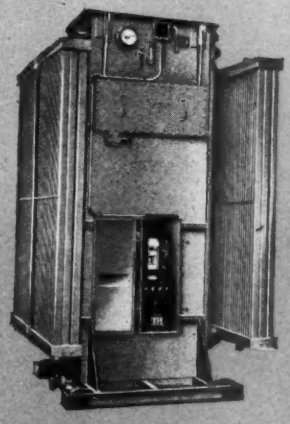

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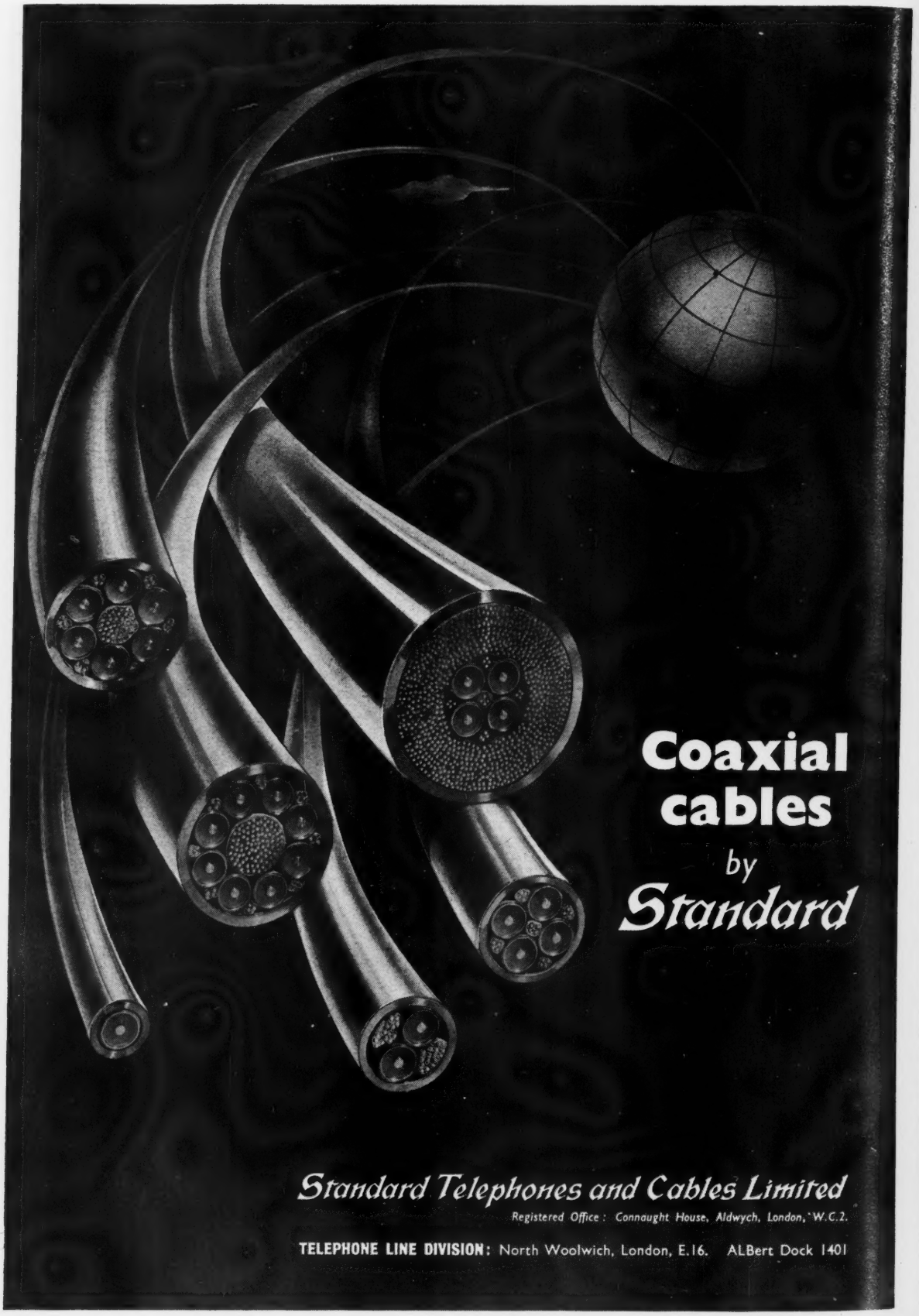
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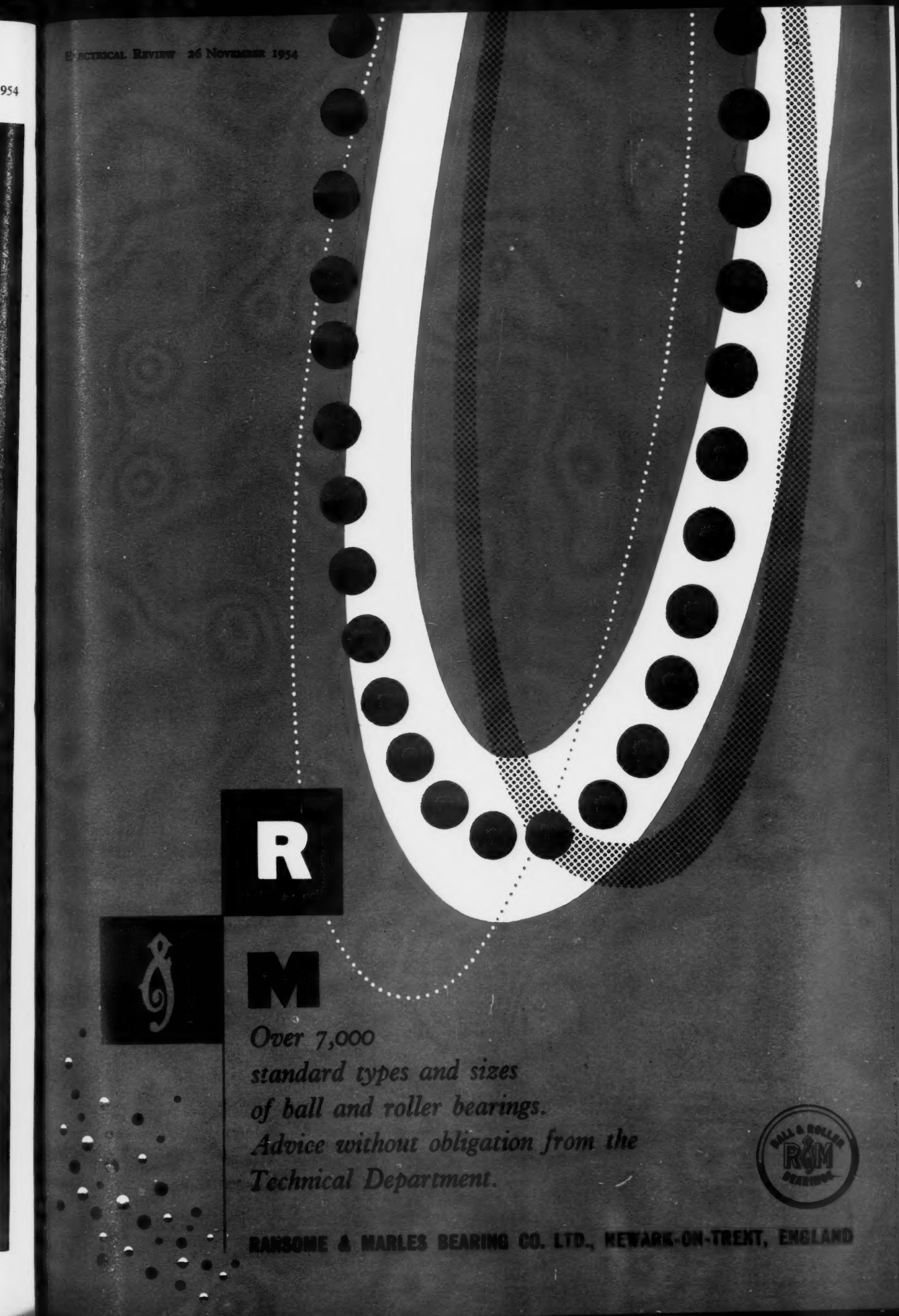

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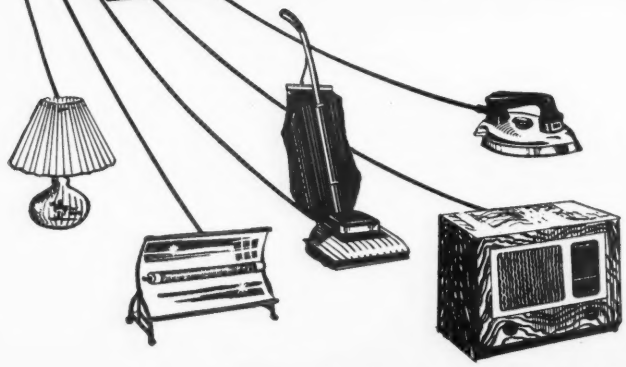

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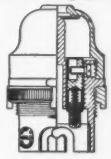

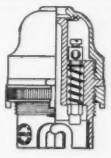

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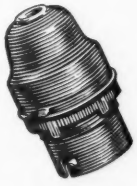
Terminals move during lamp insertion or removal.



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Spring plungers. Easily wired body removes from base rear. 2" fixing centres. Available with "loop-in" third terminal.

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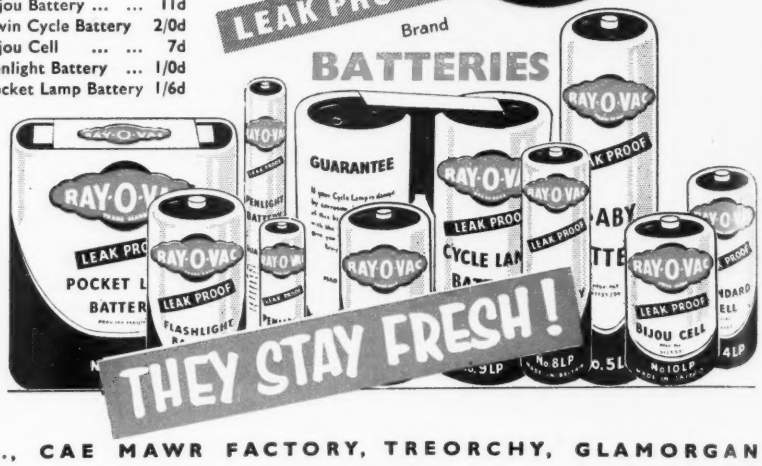

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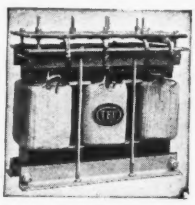

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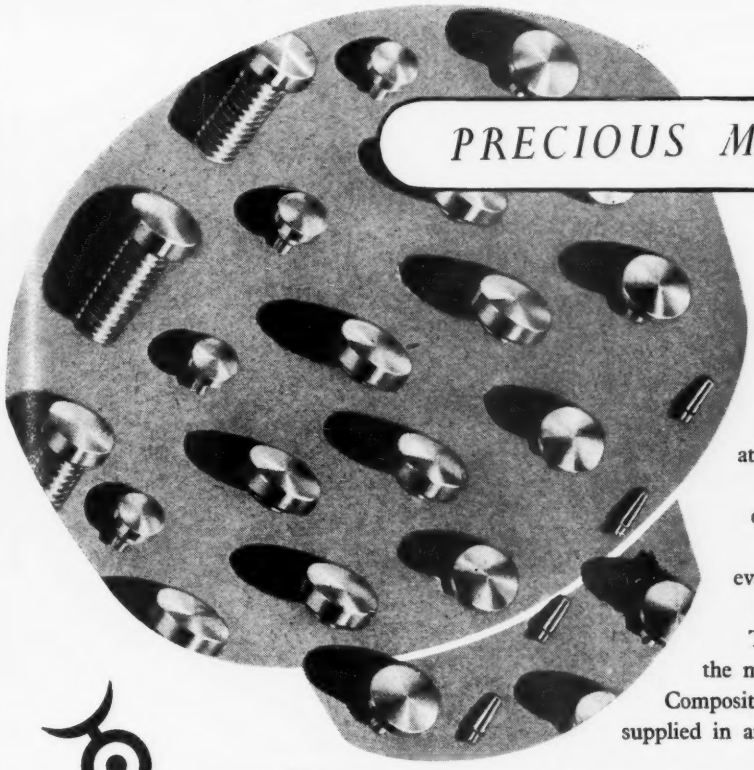

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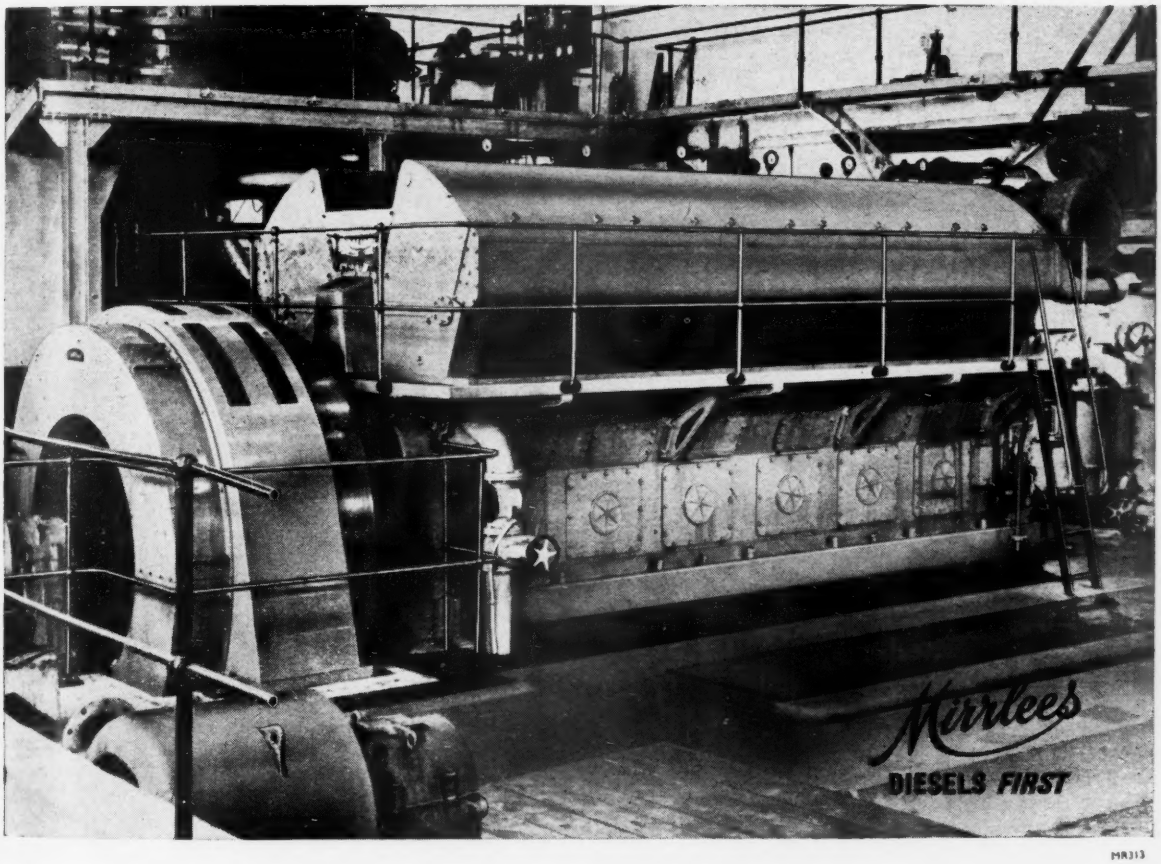

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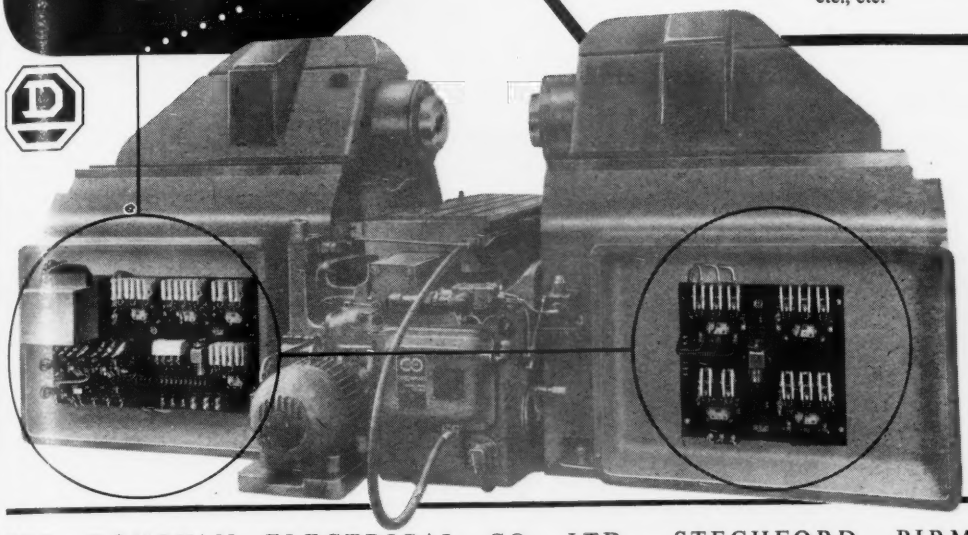

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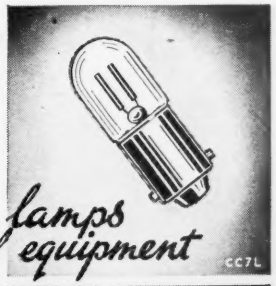

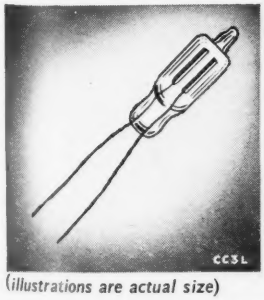

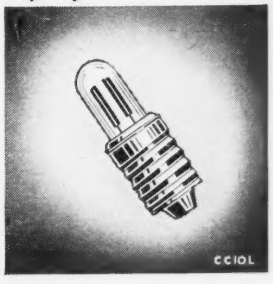

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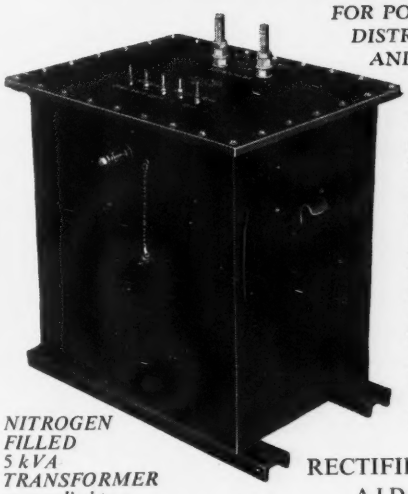

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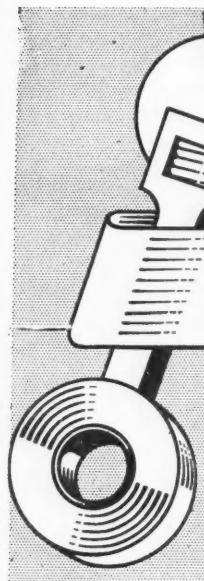

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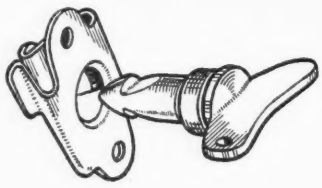

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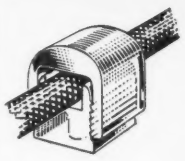

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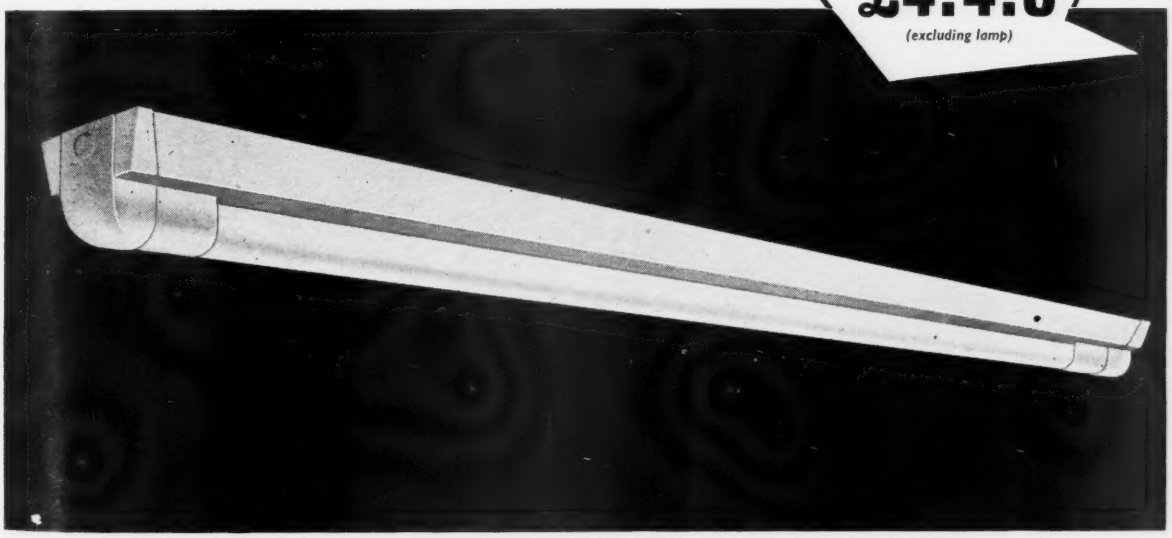

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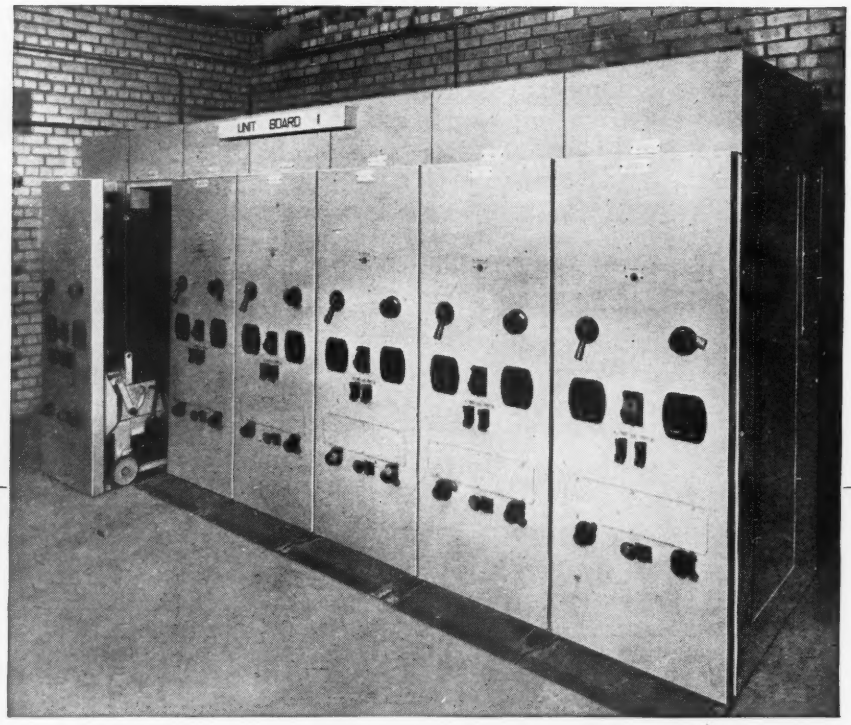
Switchgear for Bold Power Station



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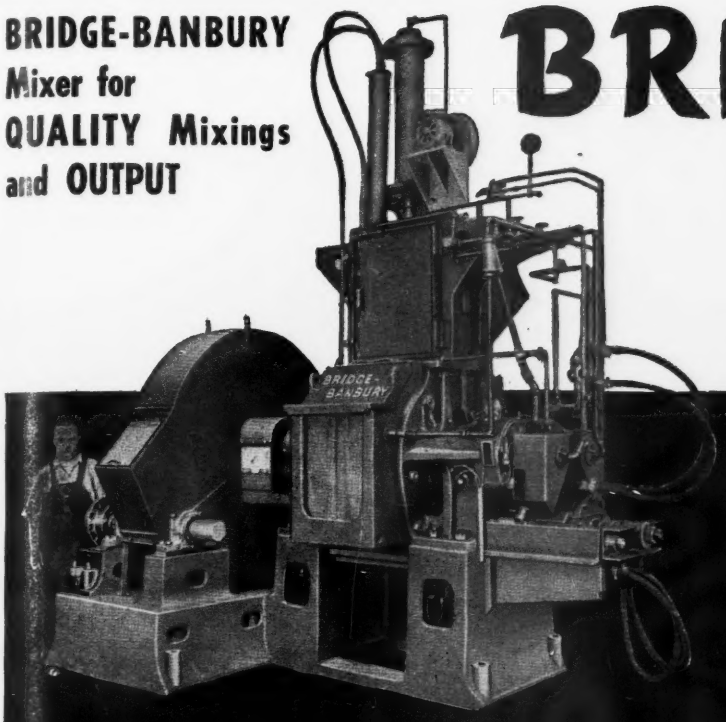

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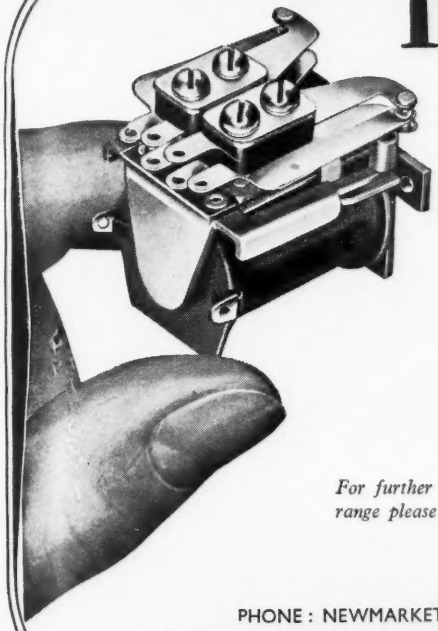

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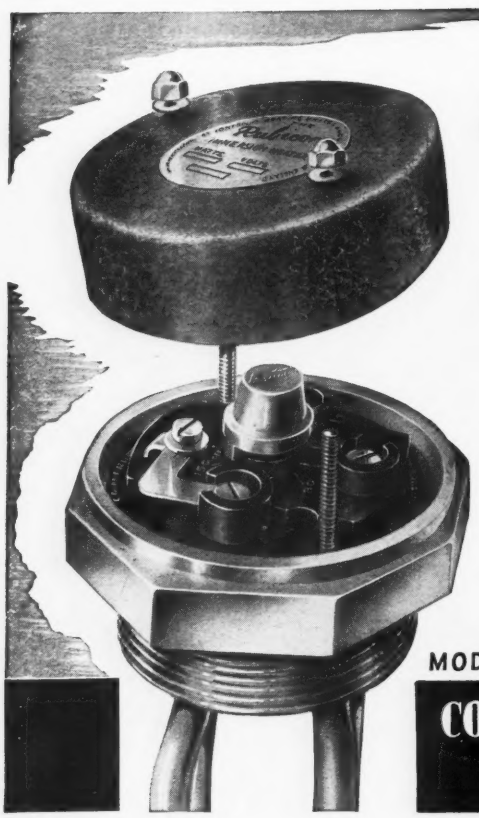

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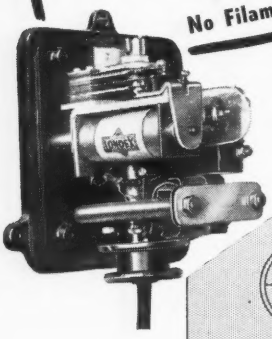

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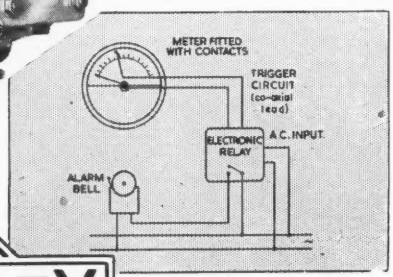

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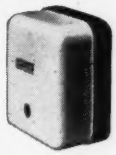

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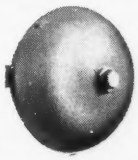

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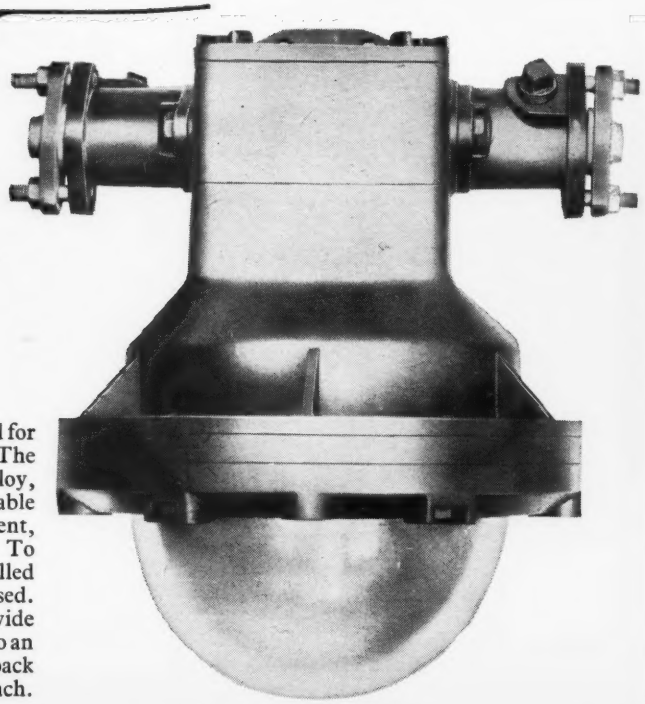

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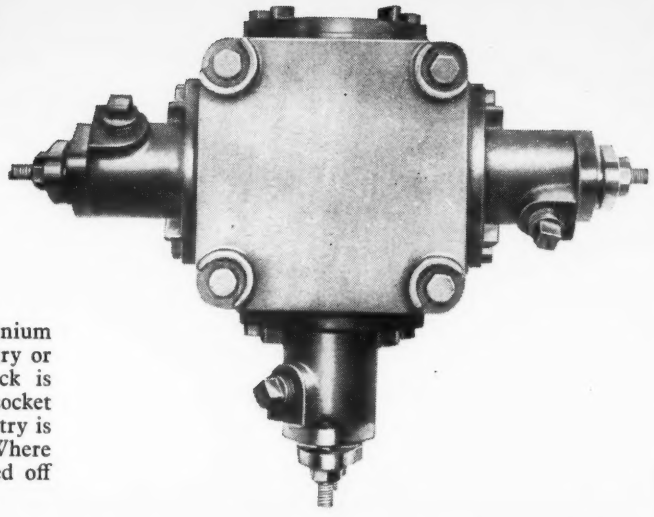

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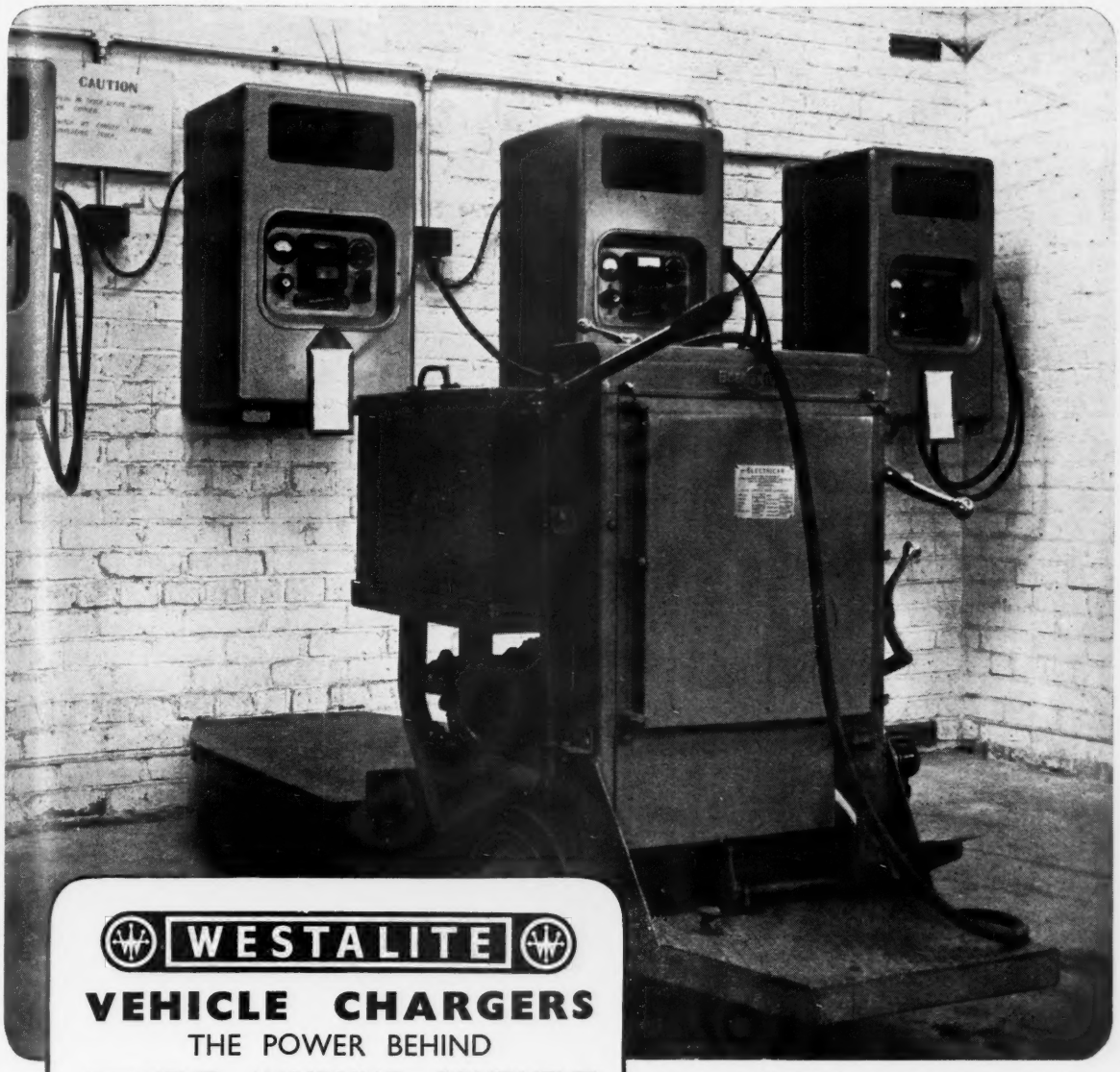

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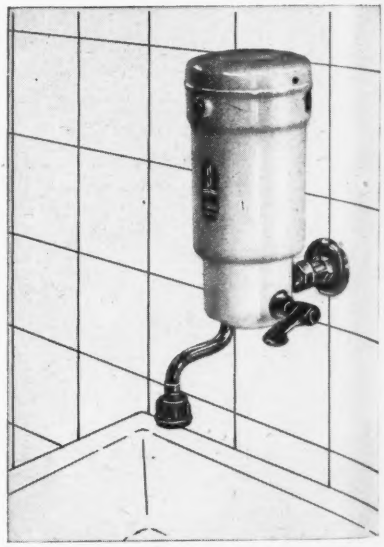

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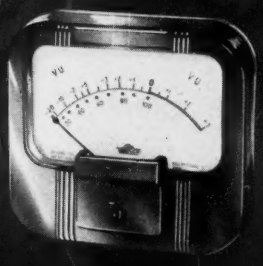
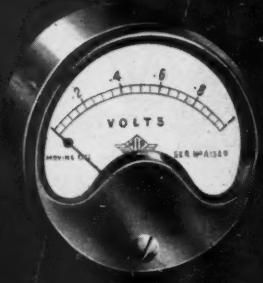


SERIES 35, 3½" DIAL V.U. METER for power level indication.



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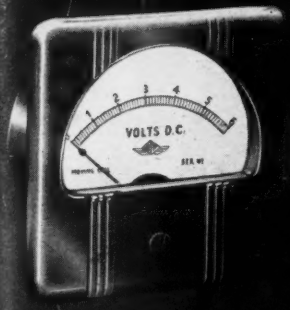

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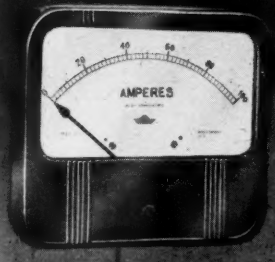

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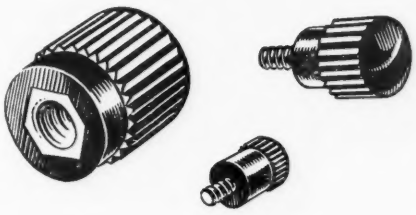
WE are happy to say that by the time this announcement appears, production of Sanders Switchgear and Accessories will have been restored in full.

The forbearance of those who have been inconvenienced, the assistance rendered, and the offers of help received from brother manufacturers, calls forth a gratitude and appreciation which we cannot adequately express in words.

SANDERS
WEDNESBURY

TERMINAL NUTS



A wide range of sizes in black or colours with many different threaded male or female inserts

Litholite Plastic Mouldings since 1901

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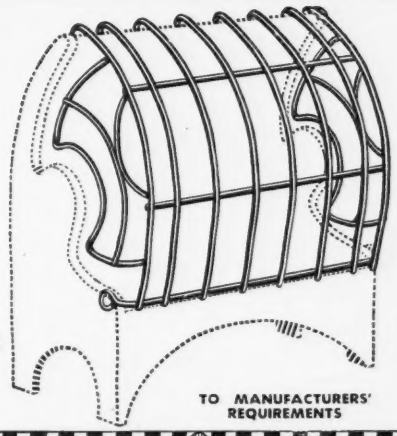
Sandown Road, WATFORD, Herts. Tel. WATFORD 4494

WIRE GUARDS
TO
BRITISH STANDARD SPECIFICATION



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FOR ELECTRIC HEATERS

TO MANUFACTURERS' REQUIREMENTS

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BALSALL HEATH WIREWORKS, WENMAN STREET
BIRMINGHAM, 12
CAL. 1733 "WIRING" B'HAM

1009

Beginning at the end

this is a Critchley thimble-type ferrule

— the most economical kind when using large quantities of similar marking. *Made for all sizes of cable. Brilliant permanent colours include red, white, blue, black, yellow and green.*

Leaflet & samples on request

CRITCHLEY BROS. LTD., BRIMSCOMBE, STROUD
Telephone : BRIMSCOMBE 2208 GLOS

NIPHAN CABLE COUPLINGS

Specialists in the design and manufacture of

WEATHERPROOF
METAL-CLAD S.P., D.P., & T.P.
SWITCHES · SWITCH SOCKETS & PLUGS
5 to 300 amp. 250 and 500 volt.
Designs to requirements

For Electric Lighting Installations and Power Transmission, Communication, Portable Tools, etc.

C.I. Switch Socket and Plug

C.I. Switch

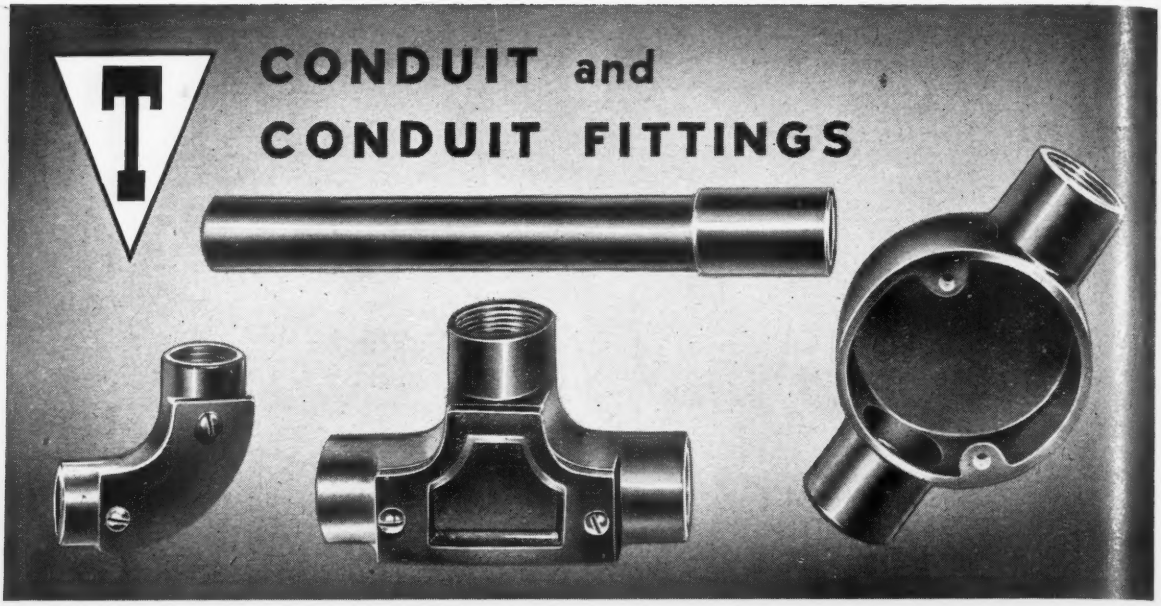
Interlocked Switch Socket with Cover and 3- or 4-pole plug

NIPHAN

Write for fully illustrated catalogue to:

SIMMONDS & STOKES (NIPHAN) LTD
VICTORIA HOUSE, SOUTHAMPTON ROW, LONDON, W.C.1
'Phone : HOLborn 2163, 8637. 'Grams : Niphan, Westcent, London

CONDUIT and CONDUIT FITTINGS



Arthur Tipper Ltd.

VICTORIA FOUNDRY
WILLENHALL
Phone 112 & 113 Staffs

London Office & Warehouse: 19-21 Morley Street, London, S.E.1. Telephone: WATerloo 7575

MARK III **PLUS+LITE**

FLUORESCENT LIGHTING UNIT

Positive instant start!

Never the slightest hesitation, but true instant start every time ... *and* it functions perfectly in humid conditions

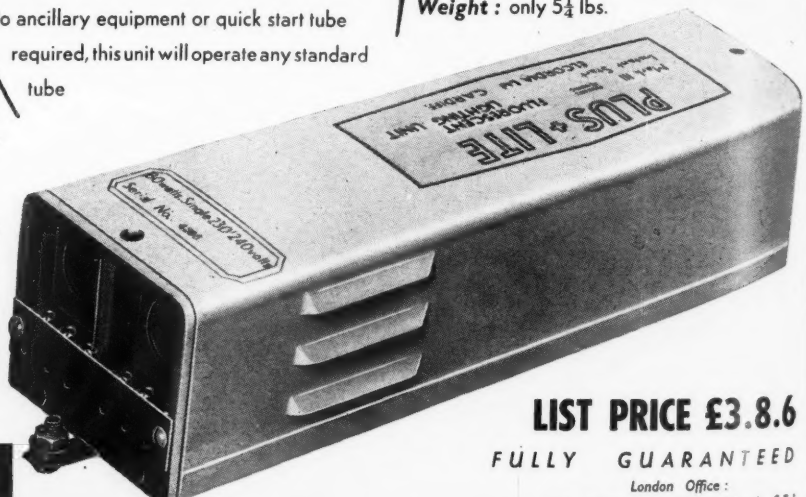
Complete in itself!

No ancillary equipment or quick start tube required, this unit will operate any standard tube

Small and Compact!

Dimensions : 9¼" long x 2⅞" wide x 2½" high

Weight : only 5¼ lbs.



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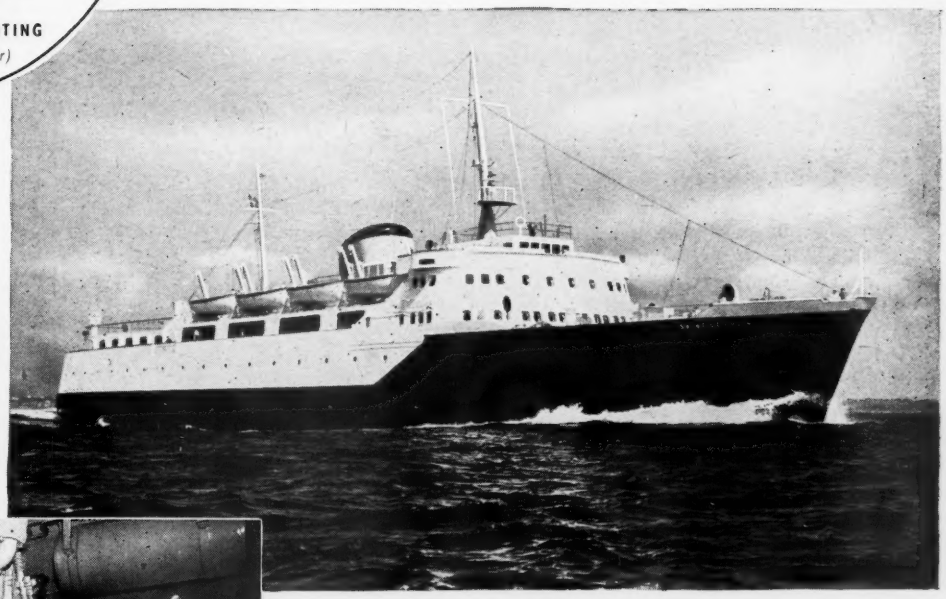
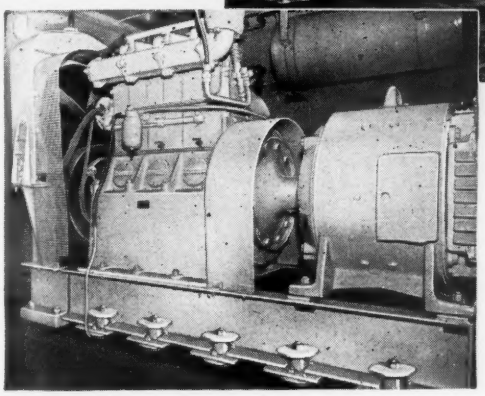
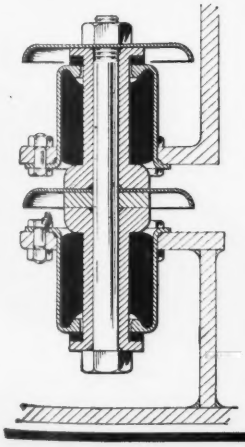


M.S. Saint-Germain

Owned by the French State Railways, the Saint-Germain is one of the many fine post-war vessels built by Helsingør Skibsvaerft Og Maskinbyggeri in which Silentbloc mountings are employed extensively with excellent results.



Baudoin 3-cylinder diesel generating set on the M.S. St. Germain mounted on 10 pairs of Silentbloc mountings fitted in series.



Left: Method of employing Silentbloc mountings in series. Oil shields protect the rubber from oil. The rubber element is shown in solid black.

● Silentbloc mountings effectively control vibration and noise due to vibration. Suitable for all auxiliary equipment on large vessels and main propulsion engines on light craft these mountings can be fitted under new or existing installations. Once fitted they need no attention. Vibration is absorbed by a rubber element which is protected from damage by a steel casing. Our Technical Department has made a special study of flexibly mounting ships' auxiliaries and offers expert help without obligation on marine vibration problems.

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THE GENERAL ELECTRIC COMPANY LIMITED · MAGNET HOUSE · KINGSWAY · LONDON · W.C.2

CLASSIFIED ADVERTISEMENTS

ADVERTISEMENTS are accepted up to **First Post on Monday** of the week of issue, and should be addressed to Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

CLASSIFIED advertisements are PREPAID at 3/- per line (approx. 6 words) per insertion. Where an advertisement includes a Box Number this counts as two words and carries an additional charge of 1/-.

DISPLAYED:—£2 per inch, per insertion. Cheques and Postal Orders should be crossed and made payable to ELECTRICAL REVIEW PUBLICATIONS LTD.

SITUATIONS WANTED:—Three insercions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

ELECTRICITY (ESSENTIAL SUPPLIES) ACT (NORTHERN IRELAND) 1954

CITY & COUNTY BOROUGH OF BELFAST

Electricity Department

TENDERS are invited for the supply, delivery and erection at the First and Second Extensions of Belfast Municipal Electric Power Station West of:—

Extensions to Low-pressure Piping Installation including valves, auxiliary pumps, tanks, air compressor and all associated equipment. The extensions include additional units required to operate in parallel with existing plant and pumps, pipework and the compressor shall be designed to match up with the existing installation and fit in with provision made for these extensions.

Form of tender (N.1620), conditions, specification and drawings, in quintuplicate, may be obtained from Messrs. Merz & McLellan, Consulting Engineers, Carliol House, Newcastle upon Tyne, 1, on payment of a deposit of five guineas, which will be refunded provided a bona fide tender is lodged and not withdrawn. Extra copies of the tender document may be obtained at one guinea each; this sum will not be returnable. Cheques should be made payable to the Belfast Corporation Electricity Department.

Each tender, in quadruplicate, in sealed envelope marked "Tender for L.P. Piping, Electricity Department," and endorsed with the name and address of the tender, must be addressed to the Town Clerk, City Hall, Belfast, so as to reach him not later than 4 p.m. on Thursday, 6th January, 1955.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

EYRE GORDON,
Chairman,
Northern Ireland Joint
Electricity Committee.

Chichester House,
Chichester St., Belfast.
19th November, 1954. 6277

BOROUGH OF HESTON & ISLEWORTH

Street Lighting Improvement

TENDERS are invited for Grade A Standard Street Lighting along approximately 1,100 yards of Staines Road, Hounslow. The works include removal of existing columns; supply and erecting 30 steel columns; and supply and fitting 30 lanterns with 3/80-watt, 5-ft. fluorescent tubes, and necessary control gear.

Conditions of contract and drawings may be seen at, and on deposit of £2 2s. returnable if a bona fide tender is received and not withdrawn, bill of quantities, tender form and specification be obtained from, the Borough Engineer's Dept., 88, Lampton Road, Hounslow.

Tenders in sealed envelopes endorsed "Tender, Staines Road Lighting," but not indicating the sender, must be delivered to me by 10 a.m. on the 10th December, 1954.

The Council are not bound to accept any tender.

D. MATHIESON,
Town Clerk.

Council House,
Hounslow. 6279

CLASSIFIED ADVERTISEMENTS
ARE PREPAID

H

ELECTRICITY (ESSENTIAL SUPPLIES) ACT (NORTHERN IRELAND) 1954

CITY AND COUNTY BOROUGH OF BELFAST

Electricity Department

TENDERS are re-invited for the supply, delivery and erection at Belfast Municipal Electric Power Station West of—

Metering Equipment to form an extension to an existing installation supplied by Landis & Gyr Ltd. The first section of the extension is required to be complete by August, 1955.

Form of tender (N.1577), conditions, specification and drawings, in quintuplicate, may be obtained from Messrs. Merz & McLellan, Consulting Engineers, Carliol House, Newcastle upon Tyne, 1, on payment of a deposit of Five Guineas, which will be refunded provided a bona fide tender is lodged and not withdrawn. Extra copies of the contract document may be obtained at One Guinea each; this sum will not be returnable. Cheques should be made payable to the Belfast Corporation Electricity Department.

Each tender, in quadruplicate, in sealed envelope marked "Tender for Metering Equipment, Electricity Department," and endorsed with the name and address of the tenderer, must be addressed to the Town Clerk, City Hall, Belfast, so as to reach him not later than 4 p.m. on Thursday, 16th December, 1954.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

EYRE GORDON,
Chairman,
Northern Ireland Joint
Electricity Committee.

Chichester House,
Chichester Street,
Belfast. 6246

BURGH OF CLYDEBANK

Great Western Road (A.82), Central Portion, Street Lighting

APPLICATIONS are invited for the supply of materials required for the provision of street lighting on Great Western Road (A.82), from the roundabout situated at the junction of Great Western Road with Drumry Road to 66 yards west of the junction of Great Western Road and Kilbowie Road, Clydebank. The equipment comprises provision of poles (of alternative design), lanterns and auxiliary gear and overhead cable.

Detailed specifications, also conditions of offer and all relevant information, may be obtained from Mr. James Craig, Inspector of Lighting, Lighting Dept., Melfort Avenue, Clydebank.

Offers should be lodged with the subscriber on or before Tuesday, 7th December, 1954.

HENRY KELLY,
Town Clerk.

Municipal Buildings,
Clydebank.
17th November, 1954. 6247

BOROUGH OF PUDSEY

Highways Department

TENDERS are invited for the supply and delivery of a hand-propelled Electric Truck, 20 cwts. capacity, with 6′ × 4′ steel platform and 24-volt batteries.

Full particulars in regard to the supply of this vehicle may be obtained from the Borough Surveyor, Town Hall, Pudsey.

Tenders in plain sealed envelopes endorsed "Tender, Electric Truck," should be forwarded to the undersigned not later than 7th December, 1954.

The Council do not bind themselves to accept the lowest or any tender.

W. R. CRUSE,
Town Clerk.

Town Hall,
Pudsey. 6278

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through the Local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order, 1952.

YORKSHIRE ELECTRICITY BOARD

No. 5 (Wakefield) Sub-Area

SENIOR ASSISTANT (Accountancy, Costing and Stores). Applicants should have wide experience of accountancy, costing and stores recording, particularly by punched card methods. Experience in staff control and the possession of a recognised accountancy qualification are essential.

Salary N.J.C. Grade 6, £730/£25/£805 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a, Denby Dale Road, Wakefield, not later than 9th December, 1954.

No. 3 (Sheffield) Sub-Area

SHEFFIELD SOUTH DISTRICT.

THIRD ASSISTANT DISTRICT ENGINEER. Applicants should preferably have technical qualifications equivalent to Corporate Membership of the Institution of Electrical Engineers.

The successful candidate will be expected to supervise construction and maintenance work and carry out operation duties on 11-kV and L.V. overhead and underground mains in a District containing a heavy industrial and densely developed residential area surrounded by a rural area.

Salary N.J.B. Class H, Grade 9, £755/£15/£800 per annum.

ROTHERHAM DISTRICT.

GENERAL ASSISTANT DISTRICT ENGINEER. Applicants should have had a good general and technical education, and should preferably have passed the Graduate Membership Examination of the Institution of Electrical Engineers. They should be experienced in the construction, operation and maintenance of H.V. and L.V. underground and overhead distribution systems.

Candidates must be prepared to reside within the District and undertake standby duties.

Salary N.J.B. Class H, Grade 11, £675/£15/£720 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, not later than 9th December, 1954.

No. 1 (Bradford) Sub-Area

SKIPTON DISTRICT.

SECOND ASSISTANT DISTRICT ENGINEER. Applicants should have passed the Graduateship Examination of the Institution of Electrical Engineers, or hold recognised equivalent technical qualifications, have substantial experience in construction, operation and maintenance of high-voltage systems, underground cables and overhead lines and substations, and medium and low-voltage networks.

Salary N.J.B. Class D, Grade 7, £675/£15/£720 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53, Sunbridge Rd., Bradford, not later than 9th December, 1954.

6257

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

Essex Sub-Area

THURROCK DISTRICT (Grays and Tilbury). 168/54.R.

DEMONSTRATOR

Candidates should have had domestic science training including electrical housecraft, should preferably hold the E.A.W. Certificate and be competent to plan and give cookery demonstrations, including lectures and advice to consumers on the use of domestic electrical appliances. Previous experience in an electricity service centre is desirable.

Salary will be in accordance with Grade 1 (£400 × £20 to £480 × £10 to £490) of the National Joint Council Salary Agreement, plus London allowance, although progress beyond £440 will be subject to a certificate that the person concerned is capable of undertaking all the duties of the grade.

Apply to the District Manager, Eastern Electricity Board, Maidstone Road, Grays, Essex.

Chilterns Sub-Area

HEMEL HEMPSTEAD DISTRICT (i) 3rd ASSISTANT ENGINEER (170/54.N.). (ii) GENERAL ASSISTANT ENGINEER (171/54.N).

Candidates for appointment (i) should have had experience of overhead construction work at voltages up to and including 11 kV and should be capable of setting to work and supervising contract labour. For appointment (ii) candidates should have had a sound training in electrical engineering and experience in the construction operation and maintenance of H.V. and L.V. overhead and underground distribution systems, including substations.

Salary for both appointments will be in accordance with Class E of the National Joint Board Salary Agreement as follows:—

(i) Grade 9, commencing at £635.

(ii) Grade 11, commencing at £555.

Apply to the District Manager, Eastern Electricity Board, 44, Marlowes, Hemel Hempstead, Herts.

AYLESBURY DISTRICT, GENERAL ASSISTANT ENGINEERS (172/54.R.).

Candidates should have had a sound training in electrical engineering and experience in the construction, operation and maintenance of underground and overhead systems, including substations.

Salary will be in accordance with Class E, Grade 11 of the National Joint Board Salary Agreement, commencing at £555.

Apply to the District Manager, Eastern Electricity Board, Exchange Street, Aylesbury, Bucks.

Northmet Sub-Area

BISHOP'S STORTFORD DISTRICT, 3rd ASSISTANT ENGINEER (164/54.R.).

Candidates should have had a sound training in electrical engineering and suitable experience in the construction, operation and maintenance of underground and overhead systems including substations.

Salary will be in accordance with Class D, Grade 9 of the National Joint Board Salary Agreement, commencing at £595.

Apply to the District Manager, Eastern Electricity Board, 25, North Street, Bishop's Stortford, Herts.

Previously advertised during October, 1954, under reference No. 151/54.R. Applications submitted on that occasion will be automatically reconsidered.

JUNIOR ENGINEERS required in the following localities:—

(i) Northmet Sub-Area Headquarters (Ref. No. 468) (165/54.R.). Two appointments.

(ii) Bishop's Stortford District (Ref. No. 477) (166/54.R.).

(iii) Hendon District (Ref. No. 501) (167/54.R.).

Candidates should have had a good general and technical education and should possess a Higher National Certificate in Electrical Engineering or equivalent qualification.

The salary for these appointments will be in accordance with the National Joint Board Salary Agreements as follows:—

(i) Class M, Grade 20, commencing at £475, plus London allowance.

(ii) Class D, Grade 12, commencing at £475.

(iii) Class F, Grade 14, commencing at £475, plus London allowance.

Apply as follows:—

(i) The Manager, Northmet Sub-Area, Eastern Electricity Board, Northmet House, Southgate, London, N.14.

(ii) The District Manager, Eastern Electricity Board, 25, North Street, Bishop's Stortford, Herts.

(iii) The District Manager, Eastern Electricity Board, 137/9, Brent Street, Hendon, London, N.W.4.

Future salaries and conditions of service for the above appointments will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications by letter, stating age, education, qualifications and experience, with details of present appointment and salary, should be submitted to the Manager concerned within fourteen days of the appearance of this advertisement.

6291

SOUTH WEST SCOTLAND ELECTRICITY BOARD

Lanarkshire Sub-Area

(1) Third Assistant District Engineer, Uddingston District
(2) General Assistant Engineer, Sub-Area Planning & Development Dept.
(3) General Assistant Engineer, Sub-Area Operation & Maintenance Dept.

APPLICATIONS are invited for the above appointments. Candidates should preferably be Graduates of the Institution of Electrical Engineers or hold equivalent qualifications.

The salary and conditions of service for each appointment will be in accordance with the National Joint Board's Agreement, Schedule A. The present classification and grading for each appointment is stated below.

The successful candidates for appointment No. 1 will require to reside within a reasonable distance of the District Office at Uddingston, and for appointments Nos. 2 and 3 within a reasonable distance of the Sub-Area Offices at Hamilton.

(1) THIRD ASSISTANT DISTRICT ENGINEER, UDDINGSTON DISTRICT. Applicants should have had a sound engineering training with subsequent experience in the operation and maintenance of H.V. and L.V. switchgear and of overhead and underground distribution systems.

The present classification and grading is F.9, salary £607/£629 per annum, which will be subject to the statutory deductions, including superannuation.

(2) GENERAL ASSISTANT ENGINEER (SUB-AREA PLANNING AND DEVELOPMENT DEPT.). Applicants should have had a sound engineering training, also a knowledge of short circuit calculations, load flow diagrams and voltage drop calculations, together with some experience in the design and layout of H.V. and L.V. underground and overhead distribution systems.

The present classification and grading is K.13, salary £583/£605 per annum, which will be subject to the statutory deductions, including superannuation.

(3) GENERAL ASSISTANT ENGINEER (SUB-AREA OPERATION & MAINTENANCE DEPT). Applicants should have had a sound engineering training, also a knowledge of short circuit calculations, load flow diagrams and voltage drop calculations, together with some experience in the operation and maintenance of H.V. and L.V. distribution systems.

The present classification and grading is K.13, salary £583/£605 per annum, which will be subject to the statutory deductions, including superannuation.

Application forms for the above, which may be obtained from the undersigned, should be returned to this office within 14 days of the date of this advertisement.

DUGALD SMITH,
Manager.

137, Almada Street,
Hamilton.

6254

ELECTRICAL DESIGNER

required by established firm of motor manufacturers. Must have practical experience in design of A.C. and D.C. motors up to 200 h.p. Also alternators.

Applicants should state age, experience and salary expected to—Box 6326.

BRITISH ELECTRICITY AUTHORITY

South East Scotland Division

GENERAL ASSISTANT ENGINEER required in the Technical Department at Divisional Headquarters, Portobello.

Applicants should possess qualifications leading to Associate Membership of the I.E.E. and should preferably have experience in the design, manufacture and commissioning of switchgear and protective gear. Knowledge of transformers and alternators an advantage.

Salary scale £600-£745 per annum. (N.J.B. Class AX/BX/6). Placing according to experience. Pension scheme.

Apply in writing by 10th December, 1954, to Divisional Controller, British Electricity Authority, South East Scotland Division, British Electricity House, Portobello, Midlothian.

6290

ENGLISH ELECTRIC CO. LTD.

THE CONTINUED EXPANSION of the Aircraft Equipment Division of THE ENGLISH ELECTRIC COMPANY has caused a number of additional vacancies on the Technical Staff of the Division, and applications are invited from both senior and junior engineers to fill the following grades of technical appointments:—

(1) SYSTEMS ENGINEER, capable of analysing system characteristics of both A.C. and D.C. aircraft specifying components. To be experienced in methods of protection, voltage regulation, load sharing, system stability, etc.

(2) CONTROL GEAR DESIGNER, experienced in design of contactors, circuit breakers, relays, etc., for both A.C. and D.C. systems. Ability to "miniaturise" designs a great asset.

(3) MAGNETIC AMPLIFIER AND TRANSDUCTOR DESIGNER, to be capable of designing these units to basic system requirements.

These are senior positions and applicants for the above should preferably be of degree standard, and at least H.N.C.

(4) ENGINEER OR PHYSICIST, with aerodynamic or thermo-dynamic experience which can be applied to heat exchange problems on electrical equipment.

(5) DESIGNER-DRAUGHTSMEN, experienced in mechanical engineering and control gear engineering.

(6) CONTRACTS ENGINEERS AND TECHNICAL REPRESENTATIVES. Technical Representatives should have had previous experience in the aircraft industry, but for ALL other appointments this is not necessary.

Please apply in confidence to Ref. No. S.A.47A, Dept. C.P.S., 336/7, Strand, London, W.C.2, with full particulars of past experience and qualifications, etc., and indicating interested appointment.

6249

JOHANNESBURG, SOUTH AFRICA

APPLICATIONS are invited for the position of ASSISTANT TO THE HEAD OF THE DEPARTMENT of an old-established engineering organisation responsible for the sale of power transformers, mercury arc rectifiers, motors and switchgear. Applicants should be preferably about 30 years of age with first-class technical background, personality and some sales ability. Please write giving full details of training, qualifications and experience, and stating age, whether single or married, and salary required, to Box 1433, Frost-Smith Advg., 64, Finsbury Pavement, London, E.C.2.

6299

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT CHIEF ENGINEER (Design and Planning), Headquarters. Applications are invited from chartered electrical engineers for the appointment of Assistant Chief Engineer (Design and Planning) at the Board's Headquarters at 10, Queen's Gardens, Hove, 3, Sussex.

The salary attached to this appointment is within Scale 4 (£1,600-£1,750), approved by the National Joint Managerial and Higher Executive Grades Committee.

Experience in the preparation of schemes of D.C./A.C. changeover and the conversion of non-standard to standard distribution systems is desirable. Applicants must have a sound theoretical knowledge and have had wide practical experience in the design and development of distribution and transmission systems.

Applications should be addressed to the Engineer-in-Chief, SEEBoard, 10, Queen's Gardens, Hove, 3, Sussex, to reach him by not later than 8th December, 1954.

SENIOR SALES REPRESENTATIVES (Male), Kingston and District (2) and Sutton District (1). Salary £485 × £20 to £545 per annum plus London weighting under N.J.C. Grade 2. Superannuable. The persons appointed will be required to give advice on supply matters, tariffs, and appliance sales and installation for domestic and small commercial consumers. Applicants must be thoroughly conversant with house wiring and all types of domestic electrical appliances and in addition to acting as an outside representative must be prepared to carry out general showroom duties in any showroom within the District.

Applications on forms from C. W. Hughes, B.Sc., M.I.E.E., Surrey Manager, SEEBoard, Rough Rew, Horsham Road, Dorking, Surrey, naming 2 referees, by 8th December, 1954.

DISTRICT COMMERCIAL ASSISTANT (N.J.C.), Crawley District. Salary £400 × £20 to £480 × £10 to £490 per annum under N.J.C., Grade 1.

Applicants should have experience in domestic load development, consumers' service, tariffs, and sale of electrical appliances.

Applications to F. A. Avery, Esq., A.I.E.E., District Manager, SEEBoard, 55, High Street, Crawley, naming 2 referees, by 8th December, 1954.

A. L. BURNELL,
November, 1954. Secretary. 6283

SOUTHERN ELECTRICITY BOARD

Assistant Engineer (Maintenance & Operation)

PORTSMOUTH District of No. 3 (Portsmouth) Sub-Area. Salary N.J.B. Class G, Grade 11 (£635 × £15 to £680 per annum). N.J.B. conditions of service.

The duties of the post will be to assist the maintenance and operation of switchgear, transformers, cables and overhead lines up to and including 11 kV. The qualifications are sound technical training and experience, and preference will be given to those applicants who possess technical qualifications up to A.M.I.E.E. standard. The appointment will involve standby duties.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him in envelopes suitably endorsed not later than 6th December, 1954.

Demonstrators (Two vacancies)

Yeovil District of No. 4 (Bournemouth) Sub-Area. One based on the District Office and the other on the Shaftesbury Branch Office. Salary N.J.C. Grade 1 (£400-£490 per annum). N.J.C. conditions of service.

Applicants should be women who are qualified to advise generally on the utilisation of electric domestic appliances, to give public demonstrations of apparatus and to assist in showroom duties. The possession of an E.A.W. Certificate or equivalent Domestic Science qualification would be an advantage.

Applications on forms obtainable from the Sub-Area Secretary, 1, Priory Road, Bournemouth, and returned to him in envelopes suitably endorsed not later than 6th December, 1954. Applicants should indicate the vacancy for which they have applied or whether they wish to be considered for both.

The successful candidates for the above appointments will be required to contribute to the B.E.A. and Area Boards Superannuation Scheme, if eligible. 6282

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following posts:—

SECOND ASSISTANT ENGINEER (Mechanical), GENERATION CONSTRUCTION DEPT. AT DIVISIONAL HEADQUARTERS. Salary Class AX/DX, Grade 2, £834 - £1,053 per annum, plus London weighting.

THIRD ASSISTANT ENGINEER (Mechanical), GENERATION CONSTRUCTION DEPT. at DIVISIONAL HEADQUARTERS. Salary Class AX/DX, Grade 4, £763-£976 per annum plus London weighting.

Applicants should have had experience in the design and installation of mechanical plant for generating stations and/or a knowledge of boiler or steam turbine design.

ASSISTANT SHIFT CHARGE ENGINEER, LITTLE BARFORD GENERATING STATION. Salary Class G, Grade 9, £641-£667 per annum.

Applicants should have served an apprenticeship and obtained an O.N.C. in Electrical and/or Mechanical Engineering or equivalent, and possess experience in the operation of generating stations.

JUNIOR ENGINEER, CLIFF QUAY GENERATING STATION. Salary Class K, Grade 19, £402 per annum, to Grade 15, £545 per annum. Commencing salary depending upon qualifications and experience.

The duties of the successful applicant will include assisting in the control room on shift and other operation and investigation duties. Preference will be given to applicants who have had previous experience in a generating station and who have reached the standard of the O.N.C. in Electrical Engineering or its equivalent.

Applications stating age, qualifications and experience should be sent to the Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, London, N.14, to arrive not later than 4th December, 1954.

W. N. C. CLINCH,
Controller. 6276

EWBANK AND PARTNERS LTD.

have vacancies
for the following personnel:—

ENGINEERS FOR TECHNICAL ENGINEERING DEPARTMENT. Duties include the preparation of schemes for new power plant, both industrial and central, and also the technical analysis of existing plants. Candidates will be expected to provide evidence that their technical and practical background is such as will enable them to assess correctly a client's plant requirements and also to determine the suitability of plant offered by a manufacturer.

The work involves a considerable knowledge of thermodynamics, fluid flow mechanics, physics, and the application of these to power plant problems; for these reasons the possession of a good academic qualification in engineering is desirable. The successful candidates will be centred in London, but will be expected to undertake short visits to plant sites as required.

ENGINEERS FOR COMMISSIONING & TESTING DEPARTMENT. Candidates for this post must produce evidence that their past experience is such as will fit them to take complete charge of the commissioning of modern power plant (mechanical) and of its subsequent operation until taken over by the client. The duties of the successful candidate will in general necessitate their absence from London for periods of up to six months at a time, although duration may be much reduced in the case of plant installed in Britain.

A knowledge of testing technique as applied to boilers, turbines, cooling towers, dust collectors and auxiliary plant is desirable. The minimum age requirement is 35 years, and while good technical qualifications are highly desirable the lack of such qualifications will not necessarily debar candidates.

Applications giving details of training, qualifications and experience to date for the above positions should be sent to the Personnel Officer, Ewbank and Partners Limited, Engineering Consultants, 10/11, Grosvenor Place, London, S.W.1. 6250

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions within the Division:—

GENERAL ASSISTANT ENGINEER, TRANSMISSION DEPARTMENT, DIV. H.Q. (Vacancy No. 175/54/ER). Applicants should have experience in the manufacture, design or installation of high voltage transmission equipment and should preferably be a Graduate Member of the Institution of Electrical Engineers.

Salary will be within the new Class AX/DX, Grade 6 (£600 × £25 to £725 to £785 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications 2nd December, 1954.

ASSISTANT SHIFT CHARGE ENGINEER, BURTON-ON-TRENT POWER STATION (Vacancy No. 180/54/ER). Applicants should have H.N.C. or equivalent qualification and had experience in power station operation.

Salary will be within Class E, Grade 9 (£635 × £15 to £680 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications 9th December, 1954.

These appointments will be pensionable within the terms and provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form A.E.6/ACT, which may be obtained from the Divisional Establishments Officer, British Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote vacancy number.

L. F. JEFFREY,
19th Nov. 1954. Divisional Controller. 6286

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with the revised N.J.B. Agreement, Schedule A. Salary includes London allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. for posts (a) and Corporate Membership for post (b) an advantage.

(b) MAINTENANCE ENGINEER (Mechanical), BRUNSWICK WHARF GENERATING STATION (Vacancy No. 54/978). Wide experience necessary in maintenance of modern generating plant. Duties will include coordination of maintenance work and programmes covering the mechanical maintenance of the boiler house, turbine house, coal handling plant, etc. Salary Class K, Grade 7 = £1,023 15s. p.a.

(a) ASSISTANT SHIFT CHARGE ENGINEER, GROVE ROAD GENERATING STATION (Vacancy No. 54/979). Sound engineering and technical training with practical experience in generating station operation. Salary Class F, Grade 9 = £708 15s. p.a.

(a) STATION SHIFT CONTROL ENGINEER, ST. PANCRAS GENERATING STATION (Vacancy No. 54/980). Sound technical training, experience of D.C. and operation of H.T. switchgear. Salary Class E, Grade 10 = £624 15s. p.a.

Applications, quoting vacancy number, may be made on form obtainable from Divisional Secretary, British Electricity Authority, London Division, P.O. Box 136, Generation House, Great Portland Street, London, W.1, and be received within 14 days of this advertisement. 6281

SOUTH WALES ELECTRICITY BOARD

ASSISTANT ENGINEER required for District 465 (Brecon), Eastern Sub-Area. Applicants should have sound experience of the layout and construction of mains and substations in mainly rural areas.

Salary Class D, Grade 8 (£592/£601/£610) of the N.J.B. Schedule.

Applications, stating age, present position, salary, qualifications, experience, and three referees, to be addressed to the Secretary to arrive by 3rd December, 1954.

D. G. DODDS,
St. Mellons, Secretary.
Cardiff. 6208

SOUTH WEST SCOTLAND ELECTRICITY BOARD

Lanarkshire Sub-Area

Second Assistant Engineer (Test)

APPLICATIONS are invited for the appointment of SECOND ASSISTANT ENGINEER (Test) in the Sub-Area Protection and Transformer Testing Station at Motherwell.

Candidates should be Corporate Members of the Institution of Electrical Engineers, and an engineering degree or its equivalent is desirable. Applicants should have had a sound engineering training with subsequent experience of commissioning, testing and maintenance of H.V. feeder and transformer protection circuits, and all laboratory and field tests appertaining to a large distribution system. Applicants should also have had experience in the organisation and operation of a transformer and protective gear testing station. Experience of electronic and telecommunication circuits would be an advantage.

The salary and conditions of service will be in accordance with the National Joint Board's Agreement, Schedule A, the present classification and grading being K.7, salary £869/£907 per annum, which will be subject to the statutory deductions, including superannuation. The successful candidate will require to reside within a reasonable distance of the transformer testing station at Motherwell.

Application forms, which may be obtained from the undersigned, should be forwarded to this office within 14 days of the date of this advertisement.

DUGALD SMITH,
137, Almada Street, Manager.
Hamilton. 6255

ELECTRICAL ENGINEER

THE Chief Architect of a large retail organisation requires a qualified ELECTRICAL ENGINEER to advise him on the design, installation and general work concerning the lighting of shops. The ability to put forward progressive schemes on own initiative and develop ideas regarding the economics of internal and external lighting is of great importance. Experience of contemporary lighting is of more advantage than the normal practice adopted by the average retailer.

As this is a senior appointment, only those with outstanding ability will be considered.

Salary will be not less than £1,500, and can be increased to £2,000 per annum or higher if necessary. The post is pensionable, therefore age must not be over 45.

Applications, by letter only, giving full details of experience and present salary should be addressed to:—

The Secretary
THE PROFESSIONAL ENGINEERS APPOINTMENTS BUREAU
9, Victoria Street, Westminster, London, S.W.1

6085

NORTH WESTERN ELECTRICITY BOARD

APPOINTMENT of THIRD ASSISTANT DISTRICT ENGINEERS:—
(a) WHITEHAVEN DISTRICT.
(b) PENRITH DISTRICT.

Applicants should be capable of preparing schemes and estimates for o/h and u/g construction up to 11 kV by both direct and contract labour. A knowledge of the usual statutory and planning requirements is essential. Possession of the H.N.C. in Electrical Engineering would be an advantage.

Salary scales:—
(a) £607/£629 p.a. Grade F.9.
(b) £561/£578 p.a. Grade D.9.
N.J.B. conditions.

Applications to the Sub-Area Manager, No. 6 Sub-Area, North Western Electricity Board, Castle Green, Kendal, by 4th December, 1954. 6253

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED

has vacancies on its Design and Development staffs at Rugby, Birmingham, Coventry, Leicester and Newcastle-under-Lyme, for ELECTRICAL AND MECHANICAL ENGINEERS with experience in the following fields:—

INDUSTRIAL ELECTRONICS (all modern applications of electronics).

ELECTRICAL MACHINE DESIGN (A.C. and D.C., large, intermediate and fractional h.p. sizes).

INDUSTRIAL APPLICATION OF ELECTRICAL EQUIPMENT (steel works, mining, paper mills, machine tools and other industries).

TRANSFORMER DESIGN (large E.H.T., intermediate and small).

AIRCRAFT ELECTRICAL EQUIPMENT (A.C. and D.C. generators, motors, contactors, starters, etc.).

The openings provide good prospects for young men with technical ability and education in a large rapidly growing industry with ample opportunities for gaining experience in new fields. Young men with honours engineering or science degrees or their equivalents, and engineers with practical mechanical design experience on the drawing board, are required.

Applications should be made to the Chief Electrical Engineer's Department, The British Thomson-Houston Company Ltd., Rugby, together with particulars of technical qualifications, training and experience. 5827

LONDON ADVERTISING AGENCY

requires

QUALIFIED ELECTRICAL ENGINEER

to assist liaison, prepare briefs and produce technical advertising literature. A knowledge of the organisation of the supply industry is necessary. Experience with advertising agencies or publicity departments will influence selection.

Successful applicant will join a team of advertising specialists working on large national advertising accounts.

Details of career and salary required to—

Box 6248

LONDON ELECTRICITY BOARD

Junior Engineer (O. & M.)

APPLICATIONS are invited for the above position in the Finsbury/Shoreditch District of the Northern Sub-Area.

Applicants should have had a sound technical education up to at least National Certificate standard, with practical experience in general mains work, both D.C. and A.C., including installation and maintenance of distribution systems, with the preparation and keeping of associated records.

The post is graded under the National Joint Board Agreement as Class E, Grade 15, commencing salary £415 per annum inclusive, rising in accordance with Clause 35 to Grade 14, £470 per annum, inclusive of London allowance.

Application forms obtainable from Personnel Officer, 46, New Broad Street, London, E.C.2, to be returned completed by 6th December, 1954. Please enclose addressed envelope and quote ref. V/1829/R on envelope and all correspondence. 6232

MIDLANDS ELECTRICITY BOARD

Central Gloucestershire Sub-Area

APPLICATIONS are invited for the following superannuable posts:—

THIRD ASSISTANT DISTRICT COMMERCIAL ENGINEER, STROUD DISTRICT.

Duties will include the preparation of wiring schemes and estimates for all types of premises and sale of electrical equipment associated therewith, also advice to consumers on utilisation of supply. Applicants should have had sound technical training and experience in the above duties. Salary £595/£640 per annum (N.J.B. Grade E10).

GENERAL ASSISTANT DISTRICT COMMERCIAL ENGINEER, DEAN FOREST DISTRICT.

Duties will include advising consumers in respect of domestic and commercial electrical equipment, estimating and contracting work. Sound knowledge of electrical installation practice together with good commercial ability is necessary. Technical qualifications desirable. Salary £515/£560 per annum (N.J.B. Grade D11).

Apply in writing within 14 days, stating age, experience, present position and salary to Mr. D. Holt, Sub-Area Manager, Midlands Electricity Board, 126, London Road, Gloucester.

A. STEPHENS,
Secretary.
6292

SOUTH EASTERN GAS BOARD

Technical Assistants, Electrical Engineer's Department
(at Fairfield Street, Wandsworth, London, S.W.18)

APPLICANTS should be at least Graduates of the Institution of Electrical Engineers, or should possess qualifications which will lead to Corporate Membership.

They must be familiar with the installation operation and theory of A.C. and D.C. generating plant, transformers, switchgear, mercury arc rectifiers, A.C. and D.C. motors and cable systems.

They must be able to design electric power and lighting installations and to prepare detailed specifications, drawings and diagrams relating thereto.

They will also be required to make periodical inspections of electrical equipment in the Board's works, attend tests at manufacturers' works, and make reports thereon.

The salary will be not less than £820 p.a.

Applications received in response to the notice published in August last will be considered and re-application is not necessary.

Applications in writing, quoting reference V20/448 and giving full details, should reach the undersigned not later than fourteen days after the publication of this notice.

R. J. McCRAE,
Katharine Street, Personnel Manager.
Croydon. 6296

COLLEGE OF TECHNOLOGY, BIRMINGHAM

Department of Electrical Engineering

APPLICATIONS are invited for the post of ASSISTANT GRADE B, to teach to Higher National Certificate and degree standard.

Candidates should have a degree in electrical engineering and experience in an electrical engineering capacity. Previous teaching experience an advantage.

Salary will be in accordance with the Burnham (Further Education) Scale for Grade B Assistants (Men), £525 × £25 to £820, (Women) £475 × £20 to £655, with additional graduate and training allowances where applicable. In fixing the commencing salary account will be taken of teaching and industrial experience.

Further particulars and forms of application may be obtained from the Registrar, College of Technology, Suffolk Street, Birmingham, 1, on receipt of a stamped addressed foolscap envelope. Completed forms should be returned not later than two weeks after the appearance of this advertisement.

K. R. PILLING,
Clerk to the Governing Body.
6275

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the following positions in the Generation Operation Department. N.J.B. service conditions, superannuable appointments, salaries within Schedule A of the Agreement:—

(a) SHIFT CHARGE ENGINEER at Nechells B Power Station, Grade J7, commencing at £900 per annum. (Vacancy No. 830MD).

(b) ASSISTANT SHIFT CHARGE ENGINEER at Ironbridge Power Station, Grade H9, commencing at £755 per annum. (Vacancy No. 831MD).

Applicants for these positions should have received a sound technical training and practical experience in the operation and maintenance of steam generating plant and main switchgear. In particular for (a) applicants should be familiar with high pressure and high temperature boilers and turbines, and for (b) a knowledge of pulverised fuel firing will be an advantage.

Apply, quoting vacancy number, on form AE6, available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 11th December, 1954. 6289

INSULATION ENGINEER

required by

BRUSH ELECTRICAL ENGINEERING CO. LTD., LOUGHBOROUGH. Duties will be to investigate new materials and processes and to advise on the applications of insulation to the company's products, which include transformers, switchgear and rotating machines.

This is an interesting and responsible post and requires experience of the design of high-voltage insulation, including bushings, and ability to assist in the specification and maintenance of the quality of materials used.

He must have the personal qualities necessary to contact senior executives of the company.

Conditions of service include eligibility for staff bonus and non-contributory superannuation.

Please reply with full details to the Chief Personnel Officer, Brush Electrical Engineering Co. Ltd., Loughborough, Leics. 6207

EAST MIDLANDS ELECTRICITY BOARD

Northamptonshire Sub-Area

APPLICATIONS are invited for the position of DEMONSTRATOR in the Northampton District.

Candidates should have had a domestic science training, including electrical housecraft, and should preferably hold the E.A.W. Certificate. They would be required to advise consumers on the use of domestic electrical appliances, to give demonstrations, and to assist in service centre duties.

The salary will be in accordance with Grade 1, £400-£490 per annum, of the National Joint Council Salary Agreement. Progress beyond £440 per annum will be subject to a certificate that the person concerned is capable of undertaking all the work of the Grade.

Applications stating age, education, qualifications and experience, with details of present position, should be submitted to the Manager, Northamptonshire Sub-Area, East Midlands Electricity Board, 25, Bridge Street, Northampton, and be received within 14 days of this advertisement. 6294

METROPOLITAN-VICKERS ELEC. CO. LTD.

require DESIGN DRAUGHTSMEN for METALCLAD AND HIGH-VOLTAGE SWITCHGEAR DEVELOPMENT. Senior and Junior positions available according to experience.

Applications giving details of experience, age, etc., should be addressed to the Personnel Manager, Metropolitan-Vickers Elec. Co. Ltd., Trafford Park, Manchester, 17. 216

NORTH EASTERN ELECTRICITY BOARD

Appointment of Sub-Area Commercial Officer, Tyne Sub-Area

APPLICANTS should have received a thorough technical training and have executive experience within the Electricity Supply Industry. Corporate Membership of the I.E.E. would be an advantage.

Duties comprise responsibility for all commercial work in the Sub-Area relating to domestic, commercial and small industrial consumers and for development work connected therewith.

Salary and conditions of service in accordance with N.J.M.H.E. Agreement. Salary, Scale 3, £1,450/£1,600.

Applications, stating age, qualifications and experience, present post and salary, should be marked "Confidential," and forwarded to the Secretary (Establishments), North Eastern Electricity Board, Carliol House, Newcastle upon Tyne, within ten days of the appearance of this advertisement. 6285

BRITISH ELECTRICITY AUTHORITY

South West Scotland Division

3rd Assistant Engineer, Glasgow Grid Control Area

APPLICATIONS are invited for the position of 3rd ASSISTANT ENGINEER in the System Operation Department at Divisional Headquarters, 168, Broomhill Drive, Glasgow, W.1. The salary for the position, which is superannuable, will be in accordance with Schedule C, Grade 4, of the National Joint Board Agreement, within the range £750 to £950 per annum.

Applicants should possess qualifications leading to A.M.I.E.E. Experience in system power flow and short circuit calculations will be an advantage.

Applications on Form A.E.6 which may be obtained from any Divisional Office of the Authority should be sent to the Secretary at the above address before 14th December, 1954. 6287

FERRANTI LTD. (METER DEPT.), HOLLINWOOD

have the following vacancies:

(1) DEVELOPMENT ENGINEERS of approximately graduate status in electrical engineering or physics. The work includes a variety of electrical and electro-mechanical problems arising in the design and development of electrical measuring devices with emphasis on integrating electricity meters. (Ref. MDE.)

(2) DESIGN DRAUGHTSMEN of approximately H.N.C. standard in mechanical or electrical engineering, preferably with previous experience in the design of small precision mechanisms. (Ref. MDO.)

(3) PLANNING ENGINEERS with previous experience of planning and work study in light engineering. (Ref. MPE.)

Permanent staff appointments with pension benefits.

Application forms from Mr. T. J. Lunt, Staff Manager, Ferranti Ltd., Hollinwood, Lancs. Please quote appropriate reference. 6229

County Borough of Brighton Education Committee

BRIGHTON TECHNICAL COLLEGE

Principal: G. E. Watts, M.A., Ph.D.(Cantab.), B.Sc.(Lond.), F.R.I.C.

REQUIRED as soon as possible: ASSISTANT LECTURER (Grade B) to teach Electrical Technology, Electronics and/or Telecommunications to at least Higher National Certificate standard. Salary scale (men) £525 × £25 to £820 plus graduate and training allowances, and with increments for approved research, professional or industrial experience.

Further particulars and forms of application from the undersigned, to be returned to the Principal, Brighton Technical College, Brighton, 7, within fourteen days of the appearance of this advertisement.

W. G. STONE,
Director of Education.

54, Old Steine,
Brighton, 1. 6196

BRITISH ELECTRICITY AUTHORITY

North West, Merseyside and North Wales Division

VACANCY No. 224/54/R. ASSISTANT SHIFT CHARGE ENGINEER at Agecroft "B" Generating Station, near Manchester. Salary £715 × £15 to £760 (G.9).

Vacancy No. 225/54/R. SHIFT CHARGE ENGINEER at Blackpool Generating Station. Salary £675 × £15 to £720 (D.7).

Vacancy No. 226/54/R. ASSISTANT SHIFT CHARGE ENGINEER at Huncoat Generating Station, near Accrington. Salary £675 × £15 to £720 (F.9).

Vacancy No. 227/54/R. SHIFT CHARGE ENGINEER at Buccleugh Street Generating Station, Barrow. Salary £675 × £15 to £720 (D.7).

Applications, quoting vacancy number, to Controller, British Electricity House, 825, Wilmslow Road, Manchester, 20, before 4th Dec. 6284

BRITISH ELECTRICITY AUTHORITY

HEADQUARTERS, Bankside, London, have vacancies for:—

(a) SENIOR CIVIL ENGINEERING DRAUGHTSMAN (Grade 4).
(b) SENIOR CIVIL ENGINEERING DRAUGHTSMAN (Grade 5).
(c) CIVIL ENGINEERING DRAUGHTSMAN (Grade 6).
(d) ELECTRICAL DRAUGHTSMAN (Grade 6).

Starting salaries according to qualifications and experience:—

Grade 4 ... £788-£893 p.a. inclusive.
Grade 5 ... £672-£777 p.a. inclusive.
Grade 6 ... £536-£662 p.a. inclusive.

Pension scheme. One Saturday morning in four on duty.

Application forms from Director of Establishments, B.E.A., Winsley Street, London, W.1. Quote ref. ER./544. 6280

NORTH THAMES GAS BOARD

A DRAUGHTSMAN is required in the CHIEF ENGINEER'S DEPARTMENT at Westminster. Candidates should be experienced in the preparation of layouts, diagrams and contract specifications of high tension and low tension switchgear, cable installations and lighting schemes. Starting salary within the range £530-£735 per annum, according to age and qualifications.

The appointment is of a permanent nature and the successful candidate will be required to join the staff pension scheme.

Applications giving age and full particulars, should be sent to the Staff Controller, North Thames Gas Board, 30, Kensington Church Street, London, W.8, quoting reference 666/205. 6297

GLOUCESTERSHIRE EDUCATION COMMITTEE

DURSLEY TECHNICAL INSTITUTE requires a TEACHER OF ENGINEERING. Applicants should be qualified by examination and experience to teach either Electrical subjects to Ordinary National Certificate standard or Workshop Production to at least Intermediate City & Guilds standard and National Certificate subjects to S.2 standard. In either case the post would be Grade A, but consideration would be given for Grade B status if both Electrical Engineering and Workshop Production could be taught.

No forms required; applications should be made directly to the Principal, Dursley Technical Institute, Dursley, Glos. 6197

DEPUTY CHIEF ENGINEER

REPUTABLE and long-established London company with 1,000 employees, engaged in quantity production of precision electric instruments, mechanisms and other products, requests applications for the above post from suitably qualified engineers aged 35/45, with experience in research, development and executive direction in the field of metering, instrumentation and electronics. Salary scale £1,500-£2,000 per annum; pension scheme.

Send particulars to the Managing Director, Box 6228.

LONDON ELECTRICITY BOARD

Engineering Draughtsman

APPLICATIONS are invited for the above positions in the Design and Planning Branch of the North Western Sub-Area in Central London.

Applicants should have had a good general and technical education in electrical engineering and building construction, and experience in a mains records office dealing with systems of all voltages up to 11 kV.

The post is graded under Schedule D of the National Joint Board Agreement as Grade 6, £458 to £595 7s. per annum, inclusive of London allowance.

Application forms obtainable from Personnel Officer, 46, New Broad Street, London, E.C.2, to be returned completed by 30th November, 1954. Please enclose addressed envelope and quote ref. V/1820/R on envelope and all correspondence. 6101

BRITISH ELECTRICITY AUTHORITY

require in the Commercial Department at Headquarters in London an ASH MARKETING OFFICER for co-ordinating the commercial disposal by the Authority's Generating Divisions of pulverised fuel ash and for the energetic development of uses and markets for the ash. Experience of similar marketing problems would be valuable, but specialist qualifications or experience are not essential.

This is a new appointment, demanding initiative and the ability to promote the conversion of research indications and commercial possibilities into large-scale everyday practice.

Provisional salary N.J.M. Scale 2, £1,350-£1,500 p.a. inclusive. The post will be superannuable.

Applications, stating age, present position and salary and giving full details of experience and qualifications, to D. Moffat, Director of Establishments, Winsley Street, London, W.1, by 10th December, 1954. Quote ref. ER/543. 6205

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

GENERAL ASSISTANT ENGINEER (Transmission), Brighton District. Preference will be given to applicants with experience of installation or maintenance of high-voltage equipment, and of the operation of the Safety Rules (Transmission). Higher National Certificate or equivalent qualifications. Duties may involve construction work.

N.J.B. conditions of service, Class AX/DX, Grade 6, commencing at £600 p.a. rising ultimately to £785 p.a.

Applications giving details of education, experience, present position, etc., should be received by the Establishments Officer, British Electricity House, Lower Ham Rd., Kingston-upon-Thames, not later than 4th December, 1954. 6227

VERITYS LIMITED

Aston, Birmingham

DRAUGHTSMEN, SENIOR & JUNIOR, wanted for switch and automatic control gear.

SENIOR: Only men with a sound practical modern outlook, capable and willing to accept responsibility, will be considered for this appointment. Technical qualifications should be up to H.N.C. standard.

JUNIOR: Applicants should have had some drawing office and practical training, with technical qualification up to O.N.C., although this latter is not essential.

In the first instance replies should be by letter addressed to the Manager, Controller Department, stating experience and qualifications, together with age and salary level. 6300

SOUTH EAST SCOTLAND ELECTRICITY BOARD

Southern Sub-Area

THIRD ASSISTANT DISTRICT ENGINEER for Berwick-upon-Tweed. N.J.B. D9, £595 × £15 to £640. Candidates should be qualified to H.N.C. standard.

Applications stating age, qualifications and experience, should reach the Board at High Street, Galashiels, by 14th December, 1954. 6288

ASSISTANT TECHNICAL OFFICERS

IMPERIAL CHEMICAL INDUSTRIES LIMITED, Wilton Works, near Redcar, has further openings for ASSISTANT TECHNICAL OFFICERS in the following sections of the Drawing Office:—

MECHANICAL
ELECTRICAL
INSTRUMENT

for design of large power station extensions and other projects.

Applicants should possess the appropriate National Certificate. Appointments are to the permanent staff, 5-day/39-hour week, with first-class working conditions, including pension fund and recreation facilities.

Write for application form to Staff Officer, Imperial Chemical Industries Limited, Wilton Works, Middlesbrough, Yorkshire, or apply to the nearest Employment Exchange quoting advertisement ref. ICI/X/199/h. 6300a

COMMUNICATION ENGINEERS AND DRAUGHTSMEN

THE expanding programme of the Transmission Department offers vacancies in both senior and junior categories for LINE TRANSMISSION LABORATORY ENGINEERS and APPARATUS DESIGN ENGINEERS, and also for DRAUGHTSMEN with experience in telecommunications or light current engineering.

Specialist experience in any branch of line transmission engineering is desirable for some of the posts.

Positions offered are on the company staff, with contributory pension fund and usual staff conditions.

Applicants should write to Personnel Manager, Automatic Telephone & Electric Co. Ltd., Strowger Works, Edge Lane, Liverpool, 7, giving full details of age, qualifications and experience. 6008

NORTH WESTERN ELECTRICITY BOARD

APPOINTMENT OF ENGINEERING DRAUGHTSMAN, CONSTRUCTION SECTION, CHIEF ENGINEER'S DEPARTMENT, AREA BOARD HEADQUARTERS. Applicants should have had a good technical training and drawing office experience in the electrical design, layout and detailing of indoor and outdoor substations up to and including 33,000 volts, together with the preparation of protection system schematic and wiring diagrams.

Preference given to applicants who hold the O.N.C. and/or H.N.C. in Electrical Engineering.

Salary within range £510 × £20 to £630 p.a. according to qualifications and experience. Schedule D, Grade 6, N.J.B. conditions.

Applications to Establishment Officer, North Western Electricity Board, Cheetwood Road, Manchester, 8, by 4th December, 1954. 6252

LONDON ELECTRICITY BOARD

Architectural Draughtsmen

APPLICATIONS are invited for the above positions in the Architect's Section of the Chief Engineer's Department in Central London.

Applicants should be neat draughtsmen and preferably have had several years' experience in an architect's office.

The post is graded under Schedule D of the National Joint Board Agreement as Grade 6, £458 to £595 7s. per annum, inclusive of London allowance.

Application forms obtainable from Personnel Officer, 46, New Broad Street, London, E.C.2, to be returned within fourteen days of the publication date of this advertisement. Please enclose addressed envelope and quote ref. V/1785/R on envelope and all correspondence. 6204

A YOUNG versatile engineer required with mechanical electrical and electronic experience by small Leeds firm to take charge of site servicing and assist in preparing schemes for specialised equipment of repute. Interesting work entails contact with large industrialists. Good opportunity for keen hard worker. Full particulars.—Box 6304.

BRITISH ELECTRICITY AUTHORITY

Midlands Division

SENIOR DRAUGHTSMAN (Mechanical) is required in the Generation Construction Dept. at Divisional Headquarters, Birmingham. N.J.B. service conditions, superannuable appointment, salary within Schedule D, Grade 5, of the Agreement, £567 to £671 per annum.

Applicants should preferably have experience in the design and layout of power station plant, including boilers, turbo-alternators and ancillary equipment; high and low-pressure steam and feed pipework; condensing and feed heating systems. Appropriate technical qualifications an advantage.

Apply, quoting Vacancy No. 825MD, on form AE6, available from the Establishments Officer, 53, Wake Green Rd., Moseley, Birmingham 13, by 11th December, 1954. 6 51

SWITCHGEAR TENDER ENGINEER

EXPERIENCED Switchgear Estimating Engineer for preparation of tenders for E.H.T. metalclad and outdoor installations.

Progressive position for suitable applicant.

Apply by letter, stating age and experience, to

Staff Manager
GENERAL ELECTRIC COMPANY LIMITED
Witton, Birmingham, 6

6230

ELLIOTT BROTHERS (LONDON) LIMITED

CONTRACTS MANAGER
is required for the
AVIATION DIVISION
of the above company.

Knowledge of Air Ministry contracts procedure and costing and estimating systems, together with experience of all aspects of factory routine is essential. Preference will be given to men with engineering qualifications and background and the ability to complete negotiations at an executive level. Applications giving full particulars of age, experience, qualifications and stating salary required to:—

Personnel Officer, Century Works, Lewisham, London, S.E.13.

6295

A LARGE industrial organisation has a vacancy for an electrical draughtsman at their head office in London. Some knowledge of electrical circuits for power and lighting installations and electrical plant layout in factories is desired, also the theory connected with such installations. Aged 22/26. Reply in the first instance, stating education, age, experience and salary required, to—Box AL9699, A.K. Advg., 212a, Shaftesbury Avenue, London, W.C.2. 6293

A SENIOR draughtsman is required by a company in the Cardiff area manufacturing electrical rotating machinery 1-100 h.p. The company would prefer to appoint a man with previous experience in this field and will be prepared to offer an attractive salary to such an applicant. Congenial working conditions; non-contributory superannuation scheme; five-day week. Applications in the first instance to—Box 6301.

ALLEN WEST & Co. Ltd., Brighton, 7, require experienced men for their engineering department. Must have had experience with electrical control gear manufacturers and be capable of engineering control schemes involving contactor type gear for all industrial applications. Replies, with technical qualifications and salary required, to—Mr. E. S. Heathcote. 7724

AN opportunity occurs in progressive manufacturing concern in London area for engineer aged 25/35, with electrical or physicist degree, on development and research work on high-frequency telecommunication cable and associated testing equipment. Salary will be commensurate with qualifications and experience. Apply giving full particulars to—Box 6011

AN engineer or physicist is required for development work in methods of non-destructive testing and for the design, construction and maintenance of instruments for use in research. Preference will be given to candidates with good experience in electronics. The post carries superannuation. Application should be made to—The Director of Research, Aluminium Laboratories Limited, Banbury, Oxon. 6209

AN experienced D.C. designer capable of using his initiative required for interesting work on dynamo electric machines from 5 to 5,000 h.p./kW. A superannuation scheme in operation and the usual social amenities available in an organisation of progressive outlook. All applications will be treated with the strictest confidence and should be addressed to—The General Manager, Lancashire Dynamo & Crypto Ltd., Trafford Park, Manchester, 17. 6219

AN interesting opportunity occurs for a young man capable of building up an existing specialist export business in electrical winding wires to markets throughout the world. Applicants, who should have had some experience in export, will be required to spend many months at our Manchester works for training before setting up a new department at our Liverpool works. Salary commensurate with experience. Languages not essential. Pension scheme. Apply in writing giving details of experience, age, salary required, etc., to — Export Sales Director, Connollys (Blackley) Limited, Kirkby Industrial Estate, Liverpool. 6305

AN outstanding opportunity has arisen in a large engineering works in the Midlands for an engineer to organise and control a newly formed group responsible for metal finishing, including painting, enamelling, electro-plating and chemical pre-treatment. A fully experienced man is sought and a commensurate salary is offered for this appointment, which is permanent and has excellent prospects. The company has a staff pension scheme providing life insurance cover, and an attractive house has been reserved for the successful applicant. Please reply to Box 6198, quoting ref. S.A.9C.

APPLICATIONS are invited for an interesting post in the research department of a large manufacturing company in the North-West. The post involves the evaluation of the electrical properties of new insulation products and research thereon, using test equipment of a specialised nature. Possession of a degree or the Higher National Certificate in Electrical Engineering is desirable. Salary in accordance with qualifications and experience. Application should be made to—Box 6258.

APPLICATIONS engineer required for work on electrical design applicable to automatic control gear for mechanical handling plants and similar uses. Must have electrical knowledge to H.N.C. standard. Salary £700/£800 per annum according to age and experience. West Middlesex area. For successful applicant requiring housing accommodation, assistance may be given for skilled and key personnel. Pension scheme, canteen, etc. Write giving full details of age, experience and qualifications to—Box 6194.

APPRENTICE supervisor to assist with the co-ordination of technical studies with practical training in workshops and offices for technological and technician apprentices. Applications, stating salary expected, from qualified engineers, with previous industrial and/or service training experience, to—The Manager, Education Dept., Metropolitan-Vickers Electrical Co. Ltd., Trafford Park, Manchester, 17. 6199

ARMATURE winder required, excellent conditions and rates, 20 mins. from Waterloo. —Max Arc & Electrics Ltd., Terrace Road, Walton-on-Thames, Surrey. 170

ARMATURE winders urgently required. Top rates paid for the right men. Apply—Collins Electrical Ltd., 22, St. Albans Place, Upper Street, Islington, London, N.1. 5991

CONTRACTS manager required for well-known and progressive firm of electrical contractors. A wide experience together with initiative and drive essential. Must be capable of taking complete control. It is the intention of this company to expand this important branch of its organisation and excellent opportunity awaits the right man. Top-line salary and permanent staff pension scheme. Apply in writing giving details and salary. — Jones Electrical Limited, Wellington. 6259

BIRLEC Limited require for their service department engineers and trainees for erection, starting up and field research work on electric and fuel-fired furnace installations. Graduates in mechanical or electrical engineering or metallurgy with some practical experience preferred, though applicants with H.N.C. or equivalent qualification will be considered for trainees. These positions are essentially for younger men willing to travel extensively and assist in developing new ideas. Apply to Personnel Manager at Tyburn Road, Erdington, Birmingham, giving details of education, industrial experience and salary required. 6210

CLERK required, male or female, for accounts dept., experienced in checking purchase invoices, etc. Hammersmith district. Good salary. Reply stating full particulars of experience in confidence to—Box 6167.

DESIGN draughtsman. A vacancy exists in our design drawing office for a first-class designer for interesting work in connection with the development of automobile electrical equipment. He should be at least of H.N.C. standard and experience in the design of light electrical equipment for large quantity production would be an advantage. A good starting salary will be paid and the position provides excellent scope for advancement. In addition, design and detail draughtsmen are also required for the design of aircraft and automobile wiring systems, and applicants for these positions should have experience in the layout of electric circuits. Please reply stating age, qualifications and experience to—Personnel Manager, Joseph Lucas (Electrical) Ltd., Great King Street, Birmingham, quoting ref. PM/D/41. 143

DRAUGHTSMAN required by consulting engineers for the reproduction of electric light and power schemes. Previous experience essential. Write, stating age, experience and salary required, to—E. Wingfield-Bowles and Partners, 32, Old Queen Street, Westminster, London, S.W.1. 157

DRAUGHTSMAN required for preparation of drawings in connection with overhead line contracts. References required. Apply in writing, stating salary required and when available for employment, to—Reference S.L.R., B. French Limited, Pike Mills, Green Street, Kidderminster. 6116

DRAUGHTSMAN wanted for the development of medium-size A.C. and D.C. electrical rotating machinery. A qualified draughtsman is required and one with experience of this class of work is preferred. The post offers scope for advancement and the work is attractive. Working conditions are good and the post is pensionable. There are excellent transport and canteen facilities. Apply in writing giving full details of age and experience to—Box 6200. Mark envelope "J."

DRAUGHTSMAN with experience of electro-mechanical instrumentation required immediately for interesting work in connection with Government and commercial requirements in new and pleasant drawing office. National Certificate an advantage but not essential. Excellent conditions, pension scheme, 5-day week. Apply to — General Manager, Hendrey Relays Limited, 392, Bath Road, Slough, Bucks. 6260

DRAUGHTSMEN. Ewbank & Partners Limited, engineering consultants, have vacancies for mechanical engineering draughtsmen experienced in power station design and layout, pipework, circulating water systems, some knowledge coal and ash handling plants an advantage but not essential. Vacancies also exist for electrical engineering draughtsmen experienced in power station and substation distribution systems. The positions are permanent and pensionable, five-day week, free lunches. Write to Personnel Officer, 10/11, Grosvenor Place, London, S.W.1, stating age, details of experience, salary required. Out of London area 3rd class return fare paid to those interviewed by appointment. 6211

DRAUGHTSMEN required for mechanical design of compressed air components. Some mechanical experience essential. Applications giving details of experience, age, etc., should be addressed to—Personnel Manager, Metropolitan-Vickers Elec. Co. Ltd., Trafford Park, Manchester, 17. 217

DRAUGHTSMEN required with transformer experience. Excellent conditions and rates. Permanent and progressive posts. Apply Chief Engineer, Transformers (Watford) Ltd., Sandown Road, Watford. 6169

DRAUGHTSMEN required for automatic electric control gear; 5-day week; excellent working conditions; canteen facilities; convenient transport; incentive bonus; superannuation scheme; salary according to qualifications, ability and experience. Apply — Asst. Sec., Watford Electric & Mfg. Co. Ltd., Watford, Herts. 6234

ELECTRICAL control circuits: Electrical engineers and draughtsmen are required for the preparation of schemes and circuit diagrams for the control of power switchgear. For the more senior positions applicants should possess a degree or Higher National Certificate in Electrical Engineering and should have had previous experience. Others possessing a minimum qualification of Ordinary National Certificate may be considered for training. Apply with full particulars to — The Chief Engineer, A. Reyrolle & Co. Ltd., Hebburn, Co. Durham. 6302

ELECTRICAL draughtsmen (senior and junior) required by the British Thomson-Houston Co. Ltd., Rugby, for their electrical layout drawing office. Should have had experience in the layout of foundations, cabling and heavy busbar connections for power stations and industrial plants. Apply in writing, giving age, experience, etc., to—Manager, Drawing Offices, British Thomson-Houston Co. Ltd., Rugby. 6119

ELECTRICAL engineer required by reputable company. Must have had wide experience involving the control of men and must have been responsible for the preparation of specifications and the execution of lighting and power contracts, preferably including some cinema or theatre installations. A working knowledge of the regulations governing cinemas and theatres preferable but not absolutely essential. Salary according to experience subject to a minimum of £1,000 per annum. State age and full details of experience to—Box 7750.

ELECTRICAL engineer required to control contracting department. Able to estimate and to supervise jobs. Salary by arrangement. Details please to—Box 6214.

ELECTRICAL engineer to assist chief engineer required for gold mine in South America. Must have technical qualifications to degree or A.M.I.E.E. standard and thorough practical experience in manufacture, operation and maintenance of electrical plant. Applicants with knowledge of Spanish and previous mining experience will receive preference. Salary offered £125 per month plus additional two months' pay per year in local currency for two-year contract. Passage self and wife defrayed by company. Free furnished quarters, etc. Write giving age and full particulars training and previous appointments, with copy testimonials, to—Box R.720, c/o Streets, 110, Old Broad Street, London, E.C.2. 6306

ELECTRICAL engineer to assist in the design of transformers and voltage regulating equipment for well-established company in North London.—Box 6150.

ELECTRICAL engineer with some knowledge of mechanical engineering required for tea estate in Nyasaland. Single man preferred, age 25 to 30 years. Living accommodation provided, six months' leave every three years, passage paid; salary would be according to age and experience. Write stating age and giving full details of experience to—Box 6262.

ELECTRICAL fitter required for repair, reconditioning and testing electric motors and control gear to 200 h.p. Sound electrical knowledge of this type of work necessary.—John Phillips & Co. Ltd., India Pavilion, Exhibition Grounds, Wembley, Middx. 6173

ELECTRICAL fitters required. Top rates paid for the right men. Apply—Collins Electrical Ltd., 22, St. Albans Place, Upper Street, Islington, London, N.1. 5992

ELECTRICAL wholesaler requires the following additional staff: Order clerk, also pricing clerk; knowledge of trade essential. Storesman with good knowledge of electrical equipment.—London Electrical Co., 92, Blackfriars Road, London, S.E.1. 6215

ELECTRICIAN required, experienced in good-class industrial and commercial installation work.—Box 6261.

ENGINEERS (development) with basic experience in engineering and/or plastics, powder metallurgy, shell moulding, hot and cold heading, automatic gauging, mechanisms, and automatic assembly.—Box 6212.

ENGINEER, aged 25 to 35, preferably having Higher National Certificate, required for the maintenance of electronic equipment and the testing and alignment of new instruments used for quality control and automatic testing of all types of telecommunication cables. Apply giving full particulars to—Box 6264.

ENGINEER required for the development of a wide range of fractional horse-power motors. Experience of this work and H.N.C. (elect.) or equivalent essential. Salary approximately £700 to start. Candidates, aged 25 to 35, should apply in writing, stating age, education, qualifications and experience, to—The Employment Office, Hoover Limited, Perivale, Middx. 5968

ENGINEER required for electro-medical service department. Applicants should have knowledge of electronic circuits and be prepared to travel in Greater London area. Apply for appointment by letter or telephone.—General Radiological Ltd., Electro-Medical Department, 18, New Cavendish St., London, W.1 (Phone, Welbeck 1212). 6263

ESTIMATING engineer with knowledge of electronic applications and circuitry required for electronics division of transformer sales office. Staff pension scheme and active social club amenities. Write giving full details of experience to—Manager, Sales Office, Gresham Transformers Limited, Twickenham Road, Hanworth, Middlesex. 6266

ESTIMATOR required in sales department, experience in automatic control gear essential, some knowledge of tendering procedure desirable.—M.T.E. Control Gear Ltd., Leigh-on-Sea, Essex. 6265

ESTIMATOR/sales contact man req. by expanding neon and elec. sign company with H.O. West of London. Details of age, exp. and sal. req. to—Box 7755.

EVERSHED & VIGNOLES Ltd. require for their outside sales staff an electrical engineer of Higher National Certificate standard. Knowledge of electrical instruments and pyrometry an advantage. Write giving full details of experience, also age and salary required, to—Acton Lane Works, Chiswick, London, W.4. 6267

FORD delivery van driver, knowledge elect. trade an advantage, permanent position with West End company for steady man.—Bennett & Fountain Ltd., 122, Great Titchfield Street, London, W.1. 6309

INVOICE clerk with good knowledge wholesale elect. trade, permanent position, good wage. West End Lon.—Bennett & Fountain Ltd., 122, Great Titchfield Street, London, W.1. 6307

J. A. CRABTREE & Co. Ltd. require a senior assistant in their electrical development laboratory. Applicant should have qualified in electrical engineering (degree or H.N.C.) and have completed National Service. Apply—Secretary, Messrs. J. A. Crabtree & Co. Ltd., Lincoln Works, Walsall. 6235

JOHNSON & PHILLIPS Limited have a vacancy in their rubber cable laboratory for a young man having a good knowledge of rubber technology as applied to electric cable manufacture. Applicants should be of L.I.R.I. standard and preferably have experience in the cable industry. Applications should state age, qualifications, experience and salary expected, and be addressed to—Employment & Welfare Manager, Messrs. Johnson & Phillips Limited, Charlton, London, S.E.7. 6236

JOINTER, first-class H.T., required by London firm for 12 months' contract overseas, excellent opportunity. Write age, experience, references.—Box 6216.

JOINTERS required for aerodrome work in South-West England and Isle of Wight for up to 11-kV and telephone cables. Apply—Drake & Gorham (Contractors) Ltd., Pearl Assurance House, Royal Parade, Plymouth. 7737

LEADING company requires the services of two designer-draughtsmen to work on the development of electrical household appliances. Excellent opportunity, interesting work under ideal conditions, assured future and security, ample scope for initiative, leading to advancement. Apply in confidence to General Manager.—Box 6268.

MAINTENANCE engineer (non-resident), experienced in maintenance repair work on electric lifts and motors. Central London area and district. 44-hour week. Reply giving experience to—Box 6217.

LANCASHIRE DYNAMO & CRYPTO Ltd. have vacancies for graduates for training as design, contract, estimating, sales and servicing engineers. Applicants must possess a B.Sc. degree, H.N.D. or H.N.C. in Electrical Engineering. Suitable applicants will be offered permanent progressive positions on completion of training. Pension scheme in operation. Applications should be addressed to—Apprentice Supervisor, Lancashire Dynamo & Crypto Ltd., Trafford Park, Manchester, 17. 6220

LAYOUT draughtsman required by consulting engineers for electrical layout work including H.V. and L.V. out-door substations, in-door switchgear and cable diagrams. Applicants should possess or should be studying for H.N.C. or equivalent. Salary in accordance with qualifications. Apply in writing, reference KJB/RFS, to—Messrs. Kennedy & Donkin, 12, Caxton Street, Westminster, London, S.W.1. 6310

MANAGING director of old-established electrical contractors limited company in S.E. Lancs., desirous of gradually disposing of holding, is prepared to appoint suitable applicant with necessary training and experience as personal assistant with a view to ultimately taking over the business. Qualifications should include sound radio and television background. All applications will be treated in strict confidence.—Box 6269.

MATHER & PLATT Ltd. require the services of a senior mechanical designer, age 35-40, with experience of mechanical design of medium and large-sized rotating electrical machines. Selected applicant will be offered good salary commensurate with experience and will be eligible for first-class non-contributory pension scheme. Write to—Employment Manager, Park Works, Manchester, 10. 6237

MECHANICAL engineer required by cable works for production machine experimental and development work. Minimum qualification H.N.C. Age limits 30 to 40 years. The prospects are good and this is an opportunity for a man who likes to see the results of his ideas put into practice. Commencing salary according to qualifications and experience. Pension scheme. Apply in confidence, giving particulars in chronological order, to—Works Manager, Southern United Telephone Cables Ltd., Dagenham Dock, Essex. 6013

METHODS and motion study engineer required by manufacturers mass producing assemblies of small parts. Vacancy will suit man with practical outlook. No administrative routine. Write details experience, present salary. Location London, E.18.—Box 6311.

METROPOLITAN-VICKERS ELECTRICAL Co. Ltd., Trafford Park, Manchester, 17, have vacancies for servo engineers with some practical experience in electric servo and control circuit design and application. Qualifications required, a degree or Higher National Certificate. Applicants should not be less than 26 years of age. The posts are permanent and pensionable. Salary according to qualifications and experience. Apply in writing to the Personnel Manager, marking envelope "Servo Mechanisms." 215

PROCESS control staff. Assistants required for controlling manufacturing processes during production of high voltage paper insulated cables. Past experience not essential but mechanical engineering background advantageous. Ordinary or Higher National Certificate standard preferred and candidates must have completed National Service. Pension scheme. Canteen facilities. Reply, stating full background and salary required, to—B.I.C. (Submarine Cables) Ltd., c/o The Secretary, W. T. Glover & Co. Ltd., Trafford Park, Manchester, 17. 6121

PRODUCT development engineer. A prominent light engineering company in N.E. London area require a qualified engineer for design and development of automobile accessories. Experience in this field desirable but not essential. Commencing salary £1,000. Write giving details of qualifications and experience to—Box 6140.

PROJECT engineers wanted with experience of high production factory scheming and layout.—Box 6213.

REPRESENTATIVES sought on good commission basis by well-known London manufacturers of electric lighting fittings. Established connection essential. Salary and expenses after trial period.—Box 6122.

REPRESENTATIVE to cover Southern Electricity Board area. Applicants should be resident on the territory, have good contacts with architects, wholesalers and contractors, and possess their own car. This is an interesting and worthwhile post for a man with right background. Write in confidence to—The Sales Manager, M.K. Electric Limited, Wakefield Street, London, N.18. 6175

REPRESENTATIVE required for South of the Thames and London South Eastern Electricity Board area. Pension scheme in operation. Car owner preferred but not essential. Progressive position. Apply in strict confidence, giving full details of experience, age, salary, etc., to—Box 6017.

RESIDENT maintenance electrician required at Guy's Hospital, London, S.E.1. Experienced in A.C./D.C. generating equipment and general electrical engineering. Must have served recognised apprenticeship. Full trade rates, superannuation. Write or call — Chief Engineer. 6018

SALES representatives required, Midlands, North East England and Scotland, and the London area. Plastic cable manufacturers. Write full details, experience and connection.—Managing Director, J. Day & Co. Ltd., Harrow Manorway, Abbey Wood, London, S.E.2. 6312

SENIOR designs draughtsman. Must have some knowledge of drawing office practice in addition to varied design work associated with high-voltage switchgear. Applications giving particulars of age, experience and salary required to—Box 5996.

SENIOR diesel engineer required for service in the British West Indies to be responsible for erection and maintenance of British diesel engines up to 1,400 h.p. Knowledge and experience of generation of electricity would be an advantage. Salary up to £1,000 (including bonus) according to experience. Furnished quarters or house allowance in lieu will be provided by the company. Non-contributory pension scheme. Free medical benefits. Three months' leave on full pay, together with passages to this country, will be granted on completion of each three years of service. Healthy and equable climate. Applicants, who should be between 40 and 45 years of age, should write giving full particulars of education, training and experience to—Box 308, Dorland Advertising Ltd., 18-20, Regent St., London, S.W.1. 6270

SENIOR draughtsmen required by the Sturtevant Engineering Company Ltd., Southern House, Cannon Street, London, E.C.4. In this instance we need primarily men experienced in the design and layout of sheet metal ducting, dust collecting plant, heating and ventilating, air conditioning and fan work. Applicants wishing to make a career in the drawing office will be given special consideration and it should be noted there is no age limit. Five-day week. Pension scheme. Apply giving full particulars of age, education and experience. 6060

SENIOR estimator required with initiative and having experience in handling comprehensive enquiries involving rotating electrical machinery up to 5,000 h.p./kW. A superannuation scheme in operation and the usual social amenities available in an organisation of progressive outlook. Promotions inside and transfers to sales normally made from staff. All applications will be treated with the strictest confidence and should be addressed to—The General Manager, Lancashire Dynamo & Crypto Ltd., Trafford Park, Manchester, 17. 6218

SENIOR planning engineer required. The position demands an enthusiastic man over 25, familiar with methods relating to bulk and mass production of electrical components. Write giving details of qualifications and previous experience to—Box 6273.

STORESMAN, must know wholesale electrical trade, good wage, permanent position. West End Lon.—Bennett & Fountain Ltd., 122, Great Titchfield Street, London, W.1. 6308

SURVEYOR required for overhead line pole routes, Inverness area. Good salary plus subsistence to right man. Apply—B. French Limited, Pike Mills, Green Street, Kidderminster. 6313

SWITCHGEAR sales engineer required to deal with enquiries and orders for H.T. substation equipment. Previous similar experience an advantage, but other applicants with knowledge of switchgear will be considered. Reply stating experience and technical qualifications to—Personnel Manager, Ferguson Pailin Ltd., Higher Openshaw, Manchester, 11. 6221

SHIFT control engineers required by The Steel Company of Wales Limited (Steel Division), Port Talbot, in their electrical engineering department. The successful candidates will be responsible for the control and operation of electricity supplies and distribution systems connected with a large integrated iron and steel plant. A sound technical knowledge and previous experience with heavy industrial plant essential. Higher National Certificate or equivalent desirable. Those wishing to apply should write for official application form to the—Personnel Superintendent, The Steel Company of Wales Limited, P.O. Box No. 3, Port Talbot, Glam. 6303

TECHNICAL and advisory representative required to develop the sales of new electrical tapes (adhesive and heat-seal varieties). Must have first class connections with electric motor and transformer manufacturers throughout the country and the trade generally. First class salary and expenses to right man. Permanent position. Pension and profit-sharing schemes. Apply—Managing Director, P. P. Payne & Sons Ltd., Haydn Road, Nottingham. 6179

TECHNICAL assistant (junior) required by old-established firm of London chartered patent agents. Mechanical or electrical engineering degree or equivalent desirable. Good opening for graduate desiring to become qualified patent agent. Write giving qualifications, etc., to—Box 1868, c/o White's Ltd., 72/78, Fleet Street, London, E.C.4. 6238

TECHNICAL staff required for the large new "B & R" relay factory shortly opening at Harlow, Essex, including sales engineers, experimental engineers, etc. Relay experience not necessary, but a good knowledge of the fundamentals of electricity and physics essential. Houses will be made available.—Besson & Robinson Ltd., Kidbrooke Park Road, London, S.E.3 (Lee Green 8541, Ext. 20). 5998

TEST engineer required. Higher National Certificate in Electrical Engineering or similar qualification. Experience in the design and testing of electrical domestic apparatus. Write, before 31st December, stating qualifications and experience, to—E.D.A. Testing House, Cleeve Road, Leatherhead, Surrey. 6239

THE switchgear contracts department of The English Electric Co. Ltd., Stafford, has vacancies for senior engineers. Applicants should have recognised technical qualifications. A knowledge of modern switchgear and control gear practice, or of the protection and control of H.V. systems, transformers and generators or large industrial machine drives, is desirable. Drawing office, test or operating experience will be considered. The posts are permanent, progressive and pensionable. Please write to—Dept. C.P.S., 336/7, Strand, London, W.C.2, quoting reference 446G. 6298

TOOL designer-draughtsman required for North Lancashire electrical accessory manufacturers. Experience in design of press tools, jigs and fixtures necessary. Additional experience in design of plastic components, although not essential, is an advantage. Housing assistance given if required.—Box 6223.

TOP-level technical representatives required by Sunvic Controls Ltd. to sell their instruments and represent them in the process control instrumentation field. Applicants should possess sufficient engineering training to understand and discuss with prospective users the application of the company's instruments. Above all they should possess a successful sales record, initiative and ability to think and report clearly and pursue logical plan of action without prompting. Write giving full details of age, experience, qualifications, etc., to—Mr. S. H. Parker, General Sales Manager, 10, Essex St., London, W.C.2. 6271

TRANSFORMER designer required. Applicants must have served an apprenticeship and possess at least H.N.C. (Electrical). Aged 23-30. Good prospects for the successful candidate. Write giving full particulars of qualifications and experience to—The Staff Manager, General Electric Company Limited, Witton, Birmingham, 6. 6231

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

LARGE RETAILERS - MANUFACTURERS AREA BOARDS

EXPERIENCED EXECUTIVE, responsible for quadrupling appliance sales of present firm in four years (approaching £1 million), is now ready to accept managerial responsibility in a major organisation.—Box 7748.

TO CONSULTANTS AND CONTRACTORS, ETC.

FULLY trained and qualified Electrical and Lighting Engineer (age 30), with wide experience of senior responsibility in consulting and contracting, seeks alternative post in England or South Africa.—Box 7757.

A.M.I.E.E. (38) wishes 2 days work weekly in Kent or London area. Particularly assisting contractor with design and installation of building services.—Box 7728.

CHARTERED electrical engineer, age 41, assistant to director of mechanical-electrical products and export organisation, wide commercial, technical experience, seeks position of buyer, sales manager, or would entertain business propositions.—Box 7721.

CHIEF electrical artificer (30), leaving Fleet Air Arm mid-December, requires position with good prospects for man of ability, initiative and ambition.—Box 7761.

DIRECTOR elec. eng. company Africa (29), public school, seeks position with opportunities.—Box 7753.

ELECTRICAL engineer and buyer, age 45, over 20 years' experience, desires position with manufacturers or wholesalers. Late manager of large wholesalers 5 years. Open to all offers. Salary range £520.—J. B., 209, Spring Grove Road, Isleworth, Middlesex. 7738

ELECTRICAL engineer seeks appointment with established London contractor as manager/engineer, adaptable personality, wide experience, design of schemes, estimating and supervision to final invoicing, correspondence, etc.—Box 7726.

EXECUTIVE engineer, Assoc. I.E.E., desires change. Fully conversant with all design and manufacturing problems, including tropicalisation to Service requirements of all types of transformers, chokes and kindred apparatus. Also comprehensive knowledge of all details of cold cathode discharge tube design and processing, including fluorescent powders and the patent position. At present engaged as technical manager and chief engineer.—Box 7760.

PURCHASING manager (M.P.O.A.) seeks change. Extensive experience all modern aspects purchasing, stock control, stores. Excellent contacts all markets electrical and general engineering trades. Position sought with first-rate manufacturing concern where ability, energy and loyalty can be fully utilised.—Box 7758.

2 ELECTRICAL engrs. seek overseas contract. Extensive experience in lifts, power, lighting, transmission, able to supervise, etc., erect, test and maintain.—Box 7756.

FOR SALE

NATIONAL DIESEL GENERATING SETS

Four 50 kW, 440/220 volts D.C.

EACH comprising 6-cylinder, 4-stroke radiator cooled diesel engines, speed governed to 750 r.p.m. Two units designed for air starting, the other two for petrol engine clutch driven to flywheel. Direct coupled on bedplate to 50-kW MAWDSLEY generator. The units are completely self-contained and each has fuel tank and enclosed switchboard. Used for stand-by purposes only. Made 1947.

These sets have a considerable number of spares available.

Descriptions, photographs, drawings, etc., of the above available on request from—

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G.P.O. Box No. 145, Newcastle upon Tyne, 1.
Telephone: Low Fell 75224/5
Telegrams: "Edjam, Newcastle"
6272

REYROLLE SWITCHGEAR FOR SALE

5-Panel, 3,300-volt, 40-cycle REYROLLE Metal Clad Type CI Manually Operated Switchgear comprising:—

2 400-amp. transformer control panels.
1 400-amp., 300-h.p. motor control panel. Each complete with T/L, O/C and E/L, protection, swing frame and ammeter.
2 600-amp. feeder control panels, each complete with Merz Price protection. Swing frame and ammeter. One with single phase potential transformer.

Each of the 5 panels has complete set of floor mounting framework with automatic lock off doors, and busbar chambers containing 3-0.75 sq. inch copper bars, chambers being run in solid with compound.

Switch truck is available, also outline drawing of assembly and foundation holes.

12 years old, displaced by reason of change over to 50-cycle, 11-kV system.

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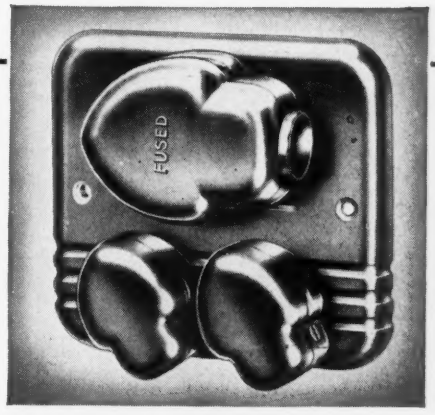

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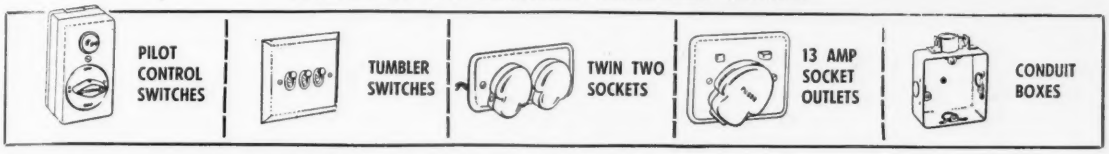

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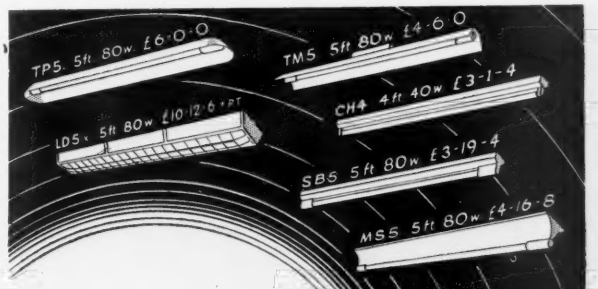

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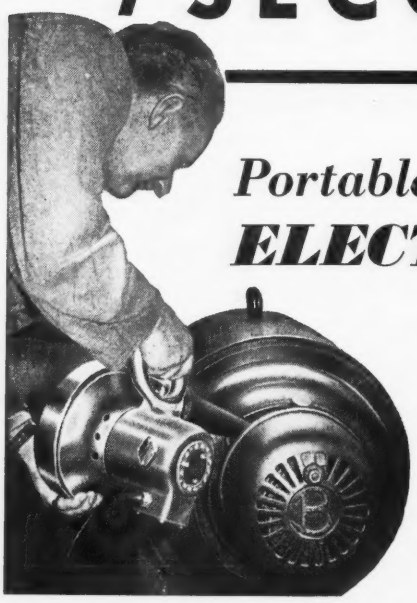

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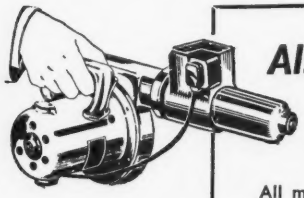

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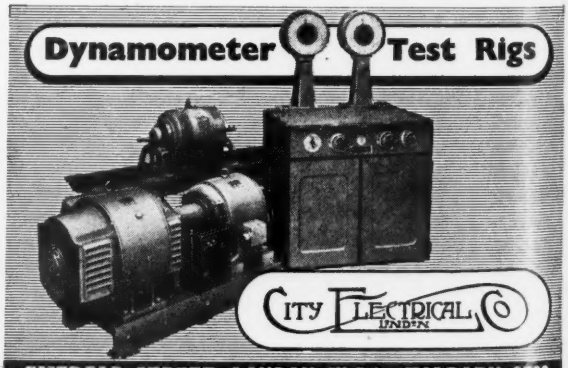

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